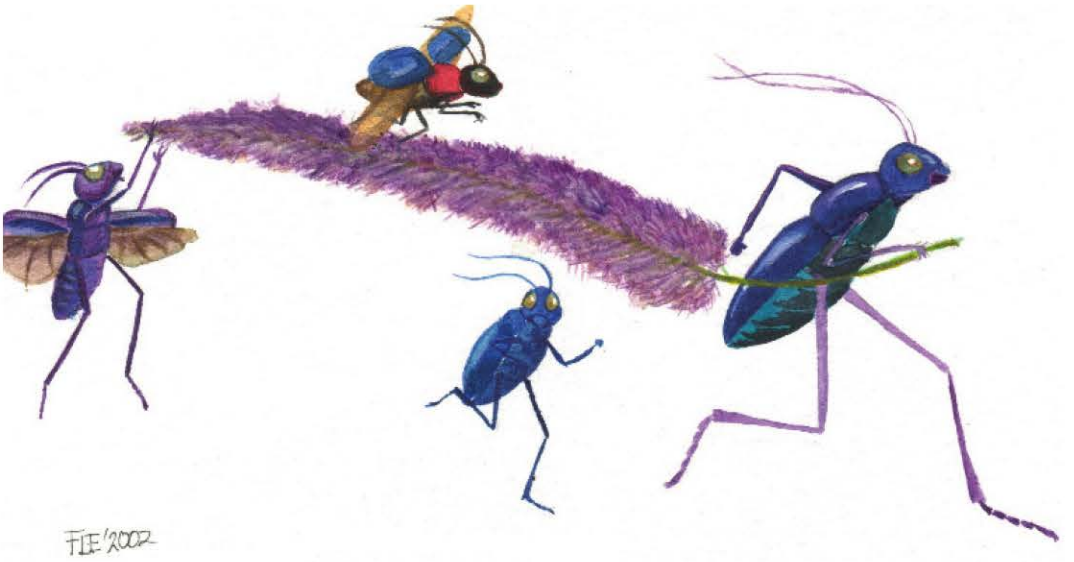
DUGESIANA

Revista de Entomología

Volumen 31 número 1



Dugesiana, Año 31, No. 1, (enero-junio, primer semestre 2024), es una publicación semestral, editada por la Universidad de Guadalajara, a través del Centro de Estudios en Zoología, por el Centro Universitario de Ciencias Biológicas y Agropecuarias. Camino Ramón Padilla Sánchez # 2100, Nextipac, Zapopan, Jalisco, Tel. 37771150 ext. 33218, http://148.202.248.171/dugesiana/index.php/DUG/index, glenusmx@gmail.com. Editor responsable: José Luis Navarrete-Heredia. Reserva de Derechos al Uso Exclusivo 04-2009-062310115100-203, ISSN: 2007-9133, otorgados por el Instituto Nacional del Derecho de Autor. Responsable de la última actualización de este número: José Luis Navarrete-Heredia, Editor y Ana Laura González-Hernández, Asistente Editorial. Fecha de la última modificación 19 de enero 2024.

ISSN 1405-4094

DUGESIANA

Volumen 31 Número 1

Fecha de distribución:19 enero 2024
Mailing date for this issue: 19 Juanary 2024

Dugesiana 31(1): 3-18
Fecha de publicación: 19 enero 2024

ISSN 1405-4094 (edición impresa)
ISSN 2007-9133 (edición online)
Artículo
http://zoobank.org/B5728731-3330-40B4-B00A-DEF9282241F6

Cicadélidofauna (Hemiptera: Cicadellidae) de Yucatán: nuevos registros para México, distribución geográfica, notas y especies de importancia económica

Leafhopper fauna (Hemiptera: Cicadellidae) of Yucatán: new records for Mexico, geographic distribution, notes, and species of economic importance

J. Adilson Pinedo-Escatel[1, 2], Edith Blanco-Rodríguez[3, 5] y Shuster Alberto Nah-Ramos[4]

[1]Colección Nacional de Insectos, Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México, Cto. Zona Deportiva S/N, Ciudad Universitaria, CDMX, C.P. 04510, México. https://orcid.org/0000-0002-7664-860X; [2]Illinois Natural History Survey, Prairie Research Institute, University of Illinois, 1816 S. Oak Street, 61820, Champaign, Illinois, EUA. jadilson@illinois.edu; [3]Colegio de Postgraduados, Campus Montecillo, km 36.5, Carretera México-Texcoco, C.P. 56230, Texcoco, Estado de México, México; https://orcid.org/0000-0001-5453-4102; [4]Campus de Ciencias Biológicas y Agropecuarias, Universidad Autónoma de Yucatán, Carretera Mérida-Xmatkuil, km. 15.5 S/N, Mérida, Yucatán, C.P. 97315 México. https://orcid.org/0000-0002-5601-2065; shuster.nah@gmail.com; [5]Autor de correspondencia: eblancor23@hotmail.com

RESUMEN

La familia Cicadellidae (Insecta: Hemiptera) cuenta con limitados inventarios de su fauna en el territorio mexicano. En la presente contribución se aporta el registro de la cicadélidofauna para el estado de Yucatán en donde se da a conocer un listado de 45 especies, 31 géneros, 13 tribus y siete subfamilias. Del total, cinco especies son nuevos registros para México y 15 nuevos registros estatales (14 para Yucatán y 1 para Jalisco). Para todas las especies se proporciona su distribución conocida en México y fuera de los límites geográficos del territorio. Además, se incluyen notas sobre las plantas hospederas conocidas y su importancia para el sector agrícola en el país.

Palabras clave: cicadélidos, Auchenorrhyncha, Península de Yucatán, nuevos reportes

ABSTRACT

The family Cicadellidae (Insecta: Hemiptera) has limited inventories of its fauna in Mexican territory. In the present contribution, records of the leafhopper fauna in the state of Yucatán are provided, where a list of 45 species, 31 genera, 13 tribes and seven subfamilies are disclosed. Of these, five species are new records for Mexico and 15 new state records (14 in Yucatán and 1 in Jalisco). For all species, current known distribution and outside Mexico is provided. In addition, notes on the known host plants and their importance for the agricultural sector in the country are included.

Key words: leafhoppers, Auchenorrhyncha, Yucatán peninsula, new records.

Hemiptera es un grupo numeroso de insectos con diversos hábitos alimenticios que comprende 127,000 especies en la actualidad (Barttlet *et al*. 2018; Zhang 2011). Dentro de este orden, existen grupos de organismos fitófagos que son estricto-obligados a consumir la sabia de ciertas familias de plantas, un claro ejemplo de esto es observado en el suborden Auchenorrhyncha, anteriormente en parte conocido como Homoptera. A un nivel jerárquico inferior, el infraorden Cicadomorpha contiene cerca de ~35,000 especies, de éstas, cerca del 30% solo se alimentan de una familia de plantas en específico (Barttlet *et al*. 2018; Dietrich 2009; Nault y Ammar 1989).

La familia Cicadellidae inserta un poco más de 23,000 especies presentes en casi todos los ecosistemas terrestres con excepción de los hielos perpetuos (Dietrich 2005; Pinedo-Escatel *et al*. 2021a). Así mismo, este grupo de organismos segmentados conforma una de las diez familias de insectos más grandes en el mundo, en donde aproximadamente a un 30% de las especies se les adjudica un importancia agroeconómica debido a la habilidad natural de transmitir o albergar diferentes agentes fitopatógenos hacia plantas de uso para la agricultura incluyendo diferentes familias vegetales tales como Poaceae, Fabaceae, Rosaceae, Solanaceae, Pinaceae, Rutaceae y Ericaceae involucradas en la producción alimentaria para el consumo (ejem. maíz, trigo, cebada, cítricos y arroz) (Pinedo-Escatel y Mora Raygoza 2018, 2015; Blanco-Rodríguez *et al*. 2015, 2022). Algunas especies en el país son consideradas como plagas principales en la producción agrícola del continente americano: *Homalodisca vitripennis* (German, 1821) y *Erythroneura elegantula* Osborn, 1928. Los daños suceden al momento de la ingesta por el insecto vector (Backus 1988; Backus *et al*. 2005) o indirectamente a través de la transmisión de un patógeno por la planta huésped (Nielson 1968).

En México, se conocen cerca de 1,400 especies sobre su extensión donde la información disponible sobre su distribución geográfica es limitada, históricamente se han empleado las enciclopedias faunísticas generadas por

Metcalft (1962), Oman *et al*. (1990), Young (1968, 1977) y Zanol (2006, 2007, 2008), además los recientes esfuerzos por Pinedo-Escatel *et al.* (2021a) y Blanco-Rodríguez y Pinedo-Escatel (2022) como fuentes primordiales para la distribución de las especies. Sin embargo, a pesar de esto, sólo cubren una pequeña porción del territorio mexicano, en otras palabras, aún permanece lejos de estar completo el inventario cicadélidofaunístico. Por otro lado, los reportes de especies en sistemas agrícolas en su mayoría se han enfocado en estudios que incluyen una o pocas especies causando daños a los cultivos, ejem. *Dalbulus maidis* (DeLong, 1923) o *D. elimatus* (Ball, 1900), siendo eficientes vectores de patógenos como: *Spiroplasma kunkelii* Whitcomb, el achaparramiento del maíz (*Cyidatus phytoplama asteris*) y el virus rayado fino del maíz (Nault y Ammar 1989). Además, la especie *Neoaliturus tenellus* (Baker, 1896) que fue recién reportada en estado latente de fitoplasmósis en el país (Abrajan-del Rio *et al*. 2014).

La cantidad de chicharritas que habitan México es un tema controversial debido a la increíble radiación de formas que existe en todas sus zonas biogeográficas (Dietrich 2005, 2009; Pinedo-Escatel *et al.* 2021b), a pesar de que se tiene una cifra tentativa de la cantidad de especies habitan el país, este número se encuentra muy por debajo de la verdadera riqueza de especies que se podría albergar en México. Por otro lado, a consecuencia de esto se ha dificultado en fundamental parte la determinación de grupos únicos por lo que indeseablemente múltiples trabajos no taxonómicos incluyen determinaciones preliminares o a nivel de morfoespecie (ejem. Burdine *et al*. 2014). De los cicadélidos que menos se conocen y las regiones menos muestreadas en el país, históricamente se encuentran los estados de Campeche, Quintana Roo y Yucatán, en general sobre la región Peninsular de México.

El presente trabajo tiene como objetivo contribuir al estado del conocimiento de los cicadélidos que están presentes en Yucatán con base a los registros históricos en la literatura, material de colecciones y recientes colectas por los autores para enlistar la cicadélidofauna de México. Aquí se muestra en extenso la primera contribución de especies del estado de Yucatán, con nuevos registros para México, además se agregan notas sobre la distribución y datos sobre las especies importantes para la agricultura peninsular de México.

MATERIALES Y MÉTODOS

El estudio se efectuó en toda la superficie del estado de Yucatán, México (Figura 1). Se realizaron colectas diversas en intervalos específicos de tiempo desde el 2010 hasta el 2023. La colecta de cicadélidos se realizó sobre la vegetación donde se utilizó una red de golpeo con un tamaño de 37 cm en diámetro y 72 cm de profundidad, la cual se desplazó siempre desde la base hasta el ápice de las plantas muestreadas, asimismo no se discriminó entre vegetación o tipos ya sean silvestre, vegetación de borde o perturbada y cultivos diversos de la región. Los especímenes adultos capturados se depositaron en frascos con alcohol al 70% para su preservación y su posterior identificación. La determinación del material colectado a nivel especifico se basó únicamente en ejemplares machos. Se utilizó la terminología y los criterios taxonómicos propuestos por Oman (1949), Anufriev y Emeljanov (1988), Kramer (1950), Dietrich (2005), Rakitov (1998) y Dmitriev (2010). Los organismos estudiados están resguardados en la Colección Nacional de Insectos del Instituto de Biología en la Universidad Nacional Autónoma de México, Ciudad de México (CNIN), Colección de Insectos del Centro en Estudios de Zoología de la Universidad de Guadalajara (CZUG), Colección de Auchenorrhyncha de JAPE (CAJAPE), Colección de Insectos del Colegio de Postgraduados, Estado de México (CEAM), Illinois Natural History Survey, University of Illinois, Estados Unidos (INHS) y en el Smithsonian Natural History Museum, Estados Unidos (USNM).

La información sobre las plantas hospederas fue agregada para aquellas especies de chicharritas que cuenten con registros tanto en la literatura como en bases de datos. Por otro lado, únicamente las especies que sean consideradas de importancia para la agricultura cuentan con sus respectivas anotaciones.

RESULTADOS Y DISCUSIÓN

En total se reportan 45 especies de 31 géneros pertenecientes a 13 tribus de siete subfamilias presentes en el estado de Yucatán (Cuadro 1). Con base al número de especies aquí reportadas el estado de Yucatán se posiciona en similitud a otros estados como Zacatecas y Querétaro (Metcalf 1962), sin embargo, en comparación a los estados de Guerrero, Estado de México o Jalisco los números son aún muy distantes (Pinedo-Escatel *et al.* 2021a, 2021b; Metcalf 1962). De todas las especies reportadas, cinco son nuevos registros para México: *Acrogonia nigriceps* (Signoret, 1855), *A. obscurior* (Fowler, 1899), *Neocrassana punctiger* Linnavuori, 1959, *Gyponana* (*Gyponana*) *pingua* DeLong, 1942 y *Ollarianus sexmaculatus* Linnavuori, 1959, todas provenientes de material revisados del estado de Yucatán. Además se presentan 14 nuevos registros de distribución para las especies *Duocrassana longula* Pinedo-Escatel, Zahniser & Dietrich, 2016, *Jikradia bispinosa* Nielson, 1979, *Amblysellus necopinus* DeLong & Hamilton, 1974, *J. melanota* (Spångberg, 1878), *Graminella comata* (Ball, 1900), *Erythrogonia execta* Medler, 1963, *Agrosoma pulchella* (Guérin-Méneville, 1829), *Neocoelidia mexicana* (DeLong, 1953), *Exitianus nigrens* DeLong & Hershberger, 1947, *E. picatus* (Gibson, 1919), *E. areolata* (Signoret, 1853), *O. insignis* DeLong, 1944, *E. gossana* Medler, 1963 y *Neocoelidia barretti* Baker, 1898 en el estado de Yucatán y además de un nuevo registro de *E. areolata* para el estado de Jalisco.

Fueron también identificados otros organismos de 27 géneros correspondientes a siete subfamilias: *Agalliopsis* (Megophthalminae), *Barela*, *Parallaxis*, *Thyphocybella*, *Rhabdotalebra*, *Alconeura*, *Empoasca*, *Idona*, *Kunzeana,*

Henribautia (Typhlocybinae), *Gypona*, *Ponana*, *Gyponana* (Iassinae), *Balclutha*, *Omanana*, *Paraphlepsius*, *Polyamia*, *Osbornellus*, *Texananus* (Deltocephalinae), *Xestocephalus* (Aphrodinae), *Xerophloea* (Ledrinae) *Pseudophera*, *Amblyscarta*, *Diedrocephala*, *Ladoffa* y *Homalodisca* (Cicadellinae); sin embargo al no disponer de ejemplares machos las identificaciones a un nivel específico no pudieron ser confirmadas, pero de acuerdo a los datos de Pinedo-Escatel *et al*. (2021a, 2021b y 2021c) la lista de especies de estos géneros podría brindar nuevos taxones y hallazgos raros para la cicadélidofauna que reside en la península de Yucatán.

Varias de las especies reportadas en este trabajo han sido previamente reportadas mayoritariamente sobre cultivos como el maíz, limón y entre otros cítricos (Blanco-Rodríguez *et al*. 2022). Las especies *Xyphon reticulatum* (Signoret 1854), *Oncometopia* (*Oncometopia*) *clarior* (Walker, 1851) y *H. vitripennis* (Germar, 1821) son especies con un estatus de alerta en el país por su presencia, sin embargo, los picos de abundancias y daños aún permanecen poco esclarecidos (Pinedo-Escatel y Moya-Raygoza 2018; Blanco-Rodríguez *et al*. 2015, 2022). Por otro lado, especies potenciales que pueden causar daños son *Draeculacephala soluta* Gibson, 1919 y *Sibovia nielsoni* Young, 1977, aunque ambas se desconocen si son patógenas o transmisoras de algún patógeno, su notoria abundancia en ambientes en el sur de México podría emerger sin las medidas fitosanitarias de manejo adecuadas como se ha reportado en otros organismos del mismo suborden (López-Collado *et al*. 2012).

Se detallan datos actualizados sobre la distribución de las especies encontradas en el estado de Yucatán, se incluyen los nuevos registros para México y así mismo, nuevos registros estatales para Yucatán y uno para Jalisco.

LISTADO PRELIMINAR DE ESPECIES DE CICADELLIDAE PRESENTES EN EL ESTADO DE YUCATÁN

Subfamilia Cicadellinae Latreille 1825
Tribu Cicadellini Latreille, 1825

***Agrosoma akenalis* Medler, 1960**.

Agrosoma akenalis Medler, 1960: 22.

Esta especie cuenta con pocos registros en México encontrándose en los estados de Veracruz, Yucatán, Oaxaca y Ciudad de México. Fuera de los límites del país se encuentra también en Guatemala.

Material revisado: (1 macho, CEAM) MÉXICO: Campeche, Castamay, 28/VII/2011, 19.85 m 19°50´16´´N 90°25´50´´W, Naranja, S. Patiño A.; (1 macho, CEAM) MÉXICO: Yucatán, San Antonio Tabi, Ticul, 6/VII/2010, 25m 20°23´43´´N 89°32´02´´W, S. Patiño A. y (1 macho, CEAM) Yucatán: Unión, Ticul, 21/VIII/2012, 25 m, 20°33′53″ N, 89°43′56″ W, naranja. S. Patiño A.

Referencias: Blanco-Rodríguez *et al.* (2022); Blanco-Rodríguez *et al.* (2015); Medler (1960)

***Agrosoma pulchella* (Guérin-Méneville, 1829)**

Figura 3 A

Tettigonia pulchella Guérin-Méneville, 1829: 59.
Cicadella pulchella Osborn, 1926: 207.
Cardioscarta pulchella Melichar, 1932: 310.
Poeciloscarta pulchella Metcalf, 1965: 76.

Especie endémica mexicana, registrada en Veracruz, Chiapas, Tabasco, Colima, Oaxaca y primer reporte para Yucatán.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´11´´ N 89°39´23´´W, 10 m, 12-oct-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Blanco-Rodríguez *et al.* (2022); Blanco-Rodríguez *et al.* (2015); Medler (1960)

***Apogonalia stali* (Signoret, 1855)**

Apogonalia stalii (Signoret, 1855)
Tettigonia stalii Signoret, 1855: 787.
Apogonalia stalii Evans, 1947: 159.

Cuenta con una distribución notable sobre la extensión territorial mexicana y se ha reportado en Jalisco, Nayarit, Zacatecas, Michoacán, Hidalgo, Yucatán, Aguascalientes, San Luis Potosí, Veracruz, Ciudad de México, Estado de México, Chiapas y Oaxaca. Además, se encuentra distribuida en los países de Guatemala, Honduras, Nicaragua, Costa Rica y El Salvador.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´02´´N 89°39´02´´W 10 m, 28-may-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Blanco-Rodríguez *et al.* (2022); Blanco-Rodríguez *et al.* (2015); Young (1977)

***Erythrogonia areolata* (Signoret, 1853)**

Figura 2 G

Tettigonia areolata Signoret, 1853: 355.
Tettigonia suavipennis Walker, 1858: 196.
Tettigoniella areolata Distant, 1908: 524.
Erythrogonia areolata Melichar, 1926: 387.

Se reporta en los estados mexicanos de Chiapas, Yucatán y Jalisco, siendo estos últimos dos primeros registros estatales para la especie. Se conoce también por habitar los bosques húmedos de Costa Rica, El Salvador, Guatemala y Honduras.

Material revisado: (1 macho INHS) México: Jalisco, rt 80, Los Mazos pass, 1325 m, 14-X-2001, J. N. Zahniser Coll.; (1 hembra INHS) México: Chiapas, rt 195 km#31, 10 km NE Chiapa de Corzo, 1000 m, 4-XI-2001, C. H. Dietrich Coll.; (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´09´´N 89°39´21´´ W, 10 m, 25-dic-2021, Nah-Ramos, S. A. Col., Red entomológica. (1 macho, CEAM) Yucatán: Unión, Ticul, 7/VII/2012, 25 m, 20°33′53″ N, 89°43′56″ W, naranja. S. Patiño A.

Referencias: Blanco-Rodríguez *et al.* (2022); Blanco-Rodríguez *et al.* (2015); Medler (1963).

***Erythrogonia execta* Medler, 1963**

Figura 2 F

Erythrogonia execta Medler, 1963: 18.

Especie endémica de México, se conoce de Colima, Sonora y se presenta el primer reporte para el estado de Yucatán.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50′02′′N 89°39′02′′W, 10 m, 25-dic-2021, Nah-Ramos, S. A. Col., Red entomológica. (1 macho, CEAM) Yucatán: Oxkutzcab, Ticul, 15/VI/2011, 33 m, 20°24′49″ N, 89°51′51″ W, limón. S. Patiño A.

Referencias: Blanco-Rodríguez *et al.* (2022); Blanco-Rodríguez *et al.* (2015); Medler (1963).

***Erythrogonia gossana* Medler, 1963**

Figura 2 H

Erythrogonia gossana Medler, 1963: 7.

En suelo mexicano se conoce del estado de Guerrero y como nuevo registro para Yucatán. Reportada también en Honduras.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50′02′′N 89°39′02′′W, 10 m, 20-ago-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Medler (1963).

***Graphogonalia evagorata* Young, 1977**

Graphogonalia evagorata Young, 1977: 990.

Reportada en Sonora, Sinaloa, Morelos, Tlaxcala y Yucatán. Se conoce también en Guatemala.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50′09′′N 89°39′21′′ W, 10 m, 14-may-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1977)

***Xyphon reticulatum* (Signoret, 1854)**

Tettigonia reticulata Signoret 1854
Tettigonia (*Diedrocephala*) *sagittifera* Uhler 1895
Tettigonia diducta Fowler 1900
Draeculacephala reticulata (Signoret 1854)
Draeculacephala sagittifera (Uhler 1895)
Tettigonia dyeri Gibson 1919
Carneocephala sagittifera (Uhler 1895)
Carneocephala dyeri (Gibson 1919)
Carneocephala diducta (Fowler 1900)
Xyphon diducta (Fowler 1900)
Xyphon dyeri (Gibson 1919)
Xyphon reticulata (Signoret 1854)
Xyphon sagittifera (Uhler 1895)

En México se conoce en los estados de Guerrero, Michoacán, Jalisco, Yucatán. Esta especie tiene una distribución muy amplia en el continente americano con presencia desde los Estados Unidos hasta Brasil y en algunas islas del caribe como Cuba, San Vicente y Granadinas. Fue introducida accidentalmente en algunos países de África y Asia (Filipinas, Costa de Marfil, Ghana, Guam [Micronesia]).

Material revisado: (1 macho, CEAM) Yucatán: San Antonio Tabi, Ticul, 26/VIII/2010, 25 m, 20°23′43″ N, 89°32′02″ W, naranja, S. Patiño A.

Referencias: Blanco-Rodríguez *et al.* (2022); Blanco-Rodríguez *et al.* (2015) Catanach *et al*. (2013); Nottingham (1932).

***Xyphon fulgidum* (Nottingham, 1932)**

Carneocephala fulgida Nottingham, 1932: 101.

Especie introducida, conocida en Yucatán. Distribución natural en Estados Unidos.

Plantas huéspedes conocidas: *Cynodon* y *Chrysothamnus*.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50′11′′ N 89°39′23′′W, 10 m, 03-sep-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Blanco-Rodríguez *et al.* (2022); Blanco-Rodríguez *et al.* (2015) Catanach *et al*. (2013); Nottingham (1932).

***Draeculacephala clypeata* Osborn, 1926**

Draeculacephala clypeata Osborn, 1926: 236
Draeculacephala lenticula Ball, 1927: 38

Reportada en Veracruz, Campeche, Chiapas, Michoacán, Morelos, Oaxaca, Tabasco, Yucatán, Puebla, Nuevo León y Sonora. Se conoce también por habitar pastizales en Guatemala, Guyana, Colombia, Perú, Argentina y Nicaragua.

Plantas huéspedes conocidas: *Zea*, *Sorghum*, *Medicago sativa*, *Oryza*, *Cynodon plectostachyus*, *Rynchosia*, *Saccharum*, *Vigna*, *Cajanus*, *Phaseolus*, *Sesamum*, *Lycopersicon*, *Nicotiana*, *Manihot*, *Ananas*, *Ipomea*, *Coffea*, y *Cucumis*.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50′07′′N 89°39′10′′W, 10 m, 11-jun-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Blanco-Rodríguez y Pinedo-Escatel (2022).

***Draeculacephala soluta* Gibson, 1919**

Draeculacephala soluta Gibson, 1919: 25

Se ha reportado en los estados de Jalisco, Morelos, Michoacán, Estado de México, Veracruz, Oaxaca, Chiapas, Yucatán, Chiapas, Quintana Roo, Querétaro, Guerrero, Campeche, Puebla, y Nuevo León. Se conoce también en los países de Estados Unidos, Colombia, Guatemala, El Salvador, Belice, Panamá, Honduras, Costa Rica y Nicaragua.

Plantas huéspedes conocidas: *Ipomoea*, *Coffea*, *Ananas*, *Luffa*, *Phaseolus*, *Panicum*, *Cajanus*, *Arachis*, *Persea*, *Gossypium*, *Hyparrhenia*, *Musa*, *Citrullus*, *Boerhaavia*, *Zingiber*, *Zea*, *Z. mays*, *Glycine*, *Solanum*, *Oryza*, *Sorghum*, *Saccharum*, *Cenchrus*, *Capsicum*, *Cynodon*, *C. plectostachyus*, *Rhynchelytrum repens*, *M. sativa*, y *Brachiaria plantaguinea*.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50′07′′N 89°39′10′′W, 10 m,

11-jun-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Blanco-Rodríguez y Pinedo-Escatel (2022).

***Hortensia similis* (Walker, 1851)**

Tettigonia similis Walker, 1851: 769.
Helochara communis similis Signoret, 1853: 178.
Tettigonia prolixa Fowler, 1900: 275.
Kolla similis Van Duzee, 1909: 213.
Tettigoniella similis Osborn, 1909: 462.
Cicadella similis Heidemann & Osborn, 1917: 349.
Cicadella cuneatula Osborn, 1926: 205.
Hortensia similis Metcalf & Bruner, 1936: 930.

En México esta especie está dispersa por toda la nación, sin embargo, los registros formales sólo apuntan a los estados de Jalisco, Michoacán, Estado de México, Ciudad de México, Yucatán, Oaxaca, Guerrero, Zacatecas y San Luis Potosí. Se encuentra ampliamente distribuida en el continente americano en los países de Estados Unidos, Guatemala, Panamá, Costa Rica, Cuba, Jamaica, Puerto Rico, Dominica, República Dominicana, Trinidad y Tobago, Haití, San Vincente, Islas Vírgenes, Isla de Mona, Colombia, Brasil, Venezuela, Argentina, Ecuador, Suriname, Guyana, Paraguay, Bolivia y Perú.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´11´´ N 89°39´23´´W, 10 m, 30-oct-2021, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1977).

***Sibovia nielsoni* Young, 1977**

Sibovia nielsoni Young, 1977: 718.

En México se ha reportado en Quintana Roo, Chiapas, Tabasco, Oaxaca, Yucatán, Jalisco y Michoacán. Esta especie cuenta con una distribución Neotropical estando presente en Panamá, Honduras, Guatemala, Nicaragua, El Salvador, Costa Rica, Dominica, Granada, Santa Lucía, Trinidad y Tobago, Venezuela, Colombia, Bolivia, Brasil y Ecuador.

Planta huésped conocida: *Cucurbita moschata*

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´02´´N 89°39´02´´W, 10 m, 11-dic-2021, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1977).

***Tylozygus fuscolineellus* (Fowler, 1900)**

Tettigonia fasciata Walker, 1851: 780.
Tettigonia fuscolineella Fowler, 1900: 290.
Tettigonia fuscolineella var. *fronterae* Fowler, 1900: 290.
Kolla bifida fasciata Barber, 1914: 531.
Tylozygus fasciatus Oman, 1949: 66.

Se ha reportado en México en los estados de Jalisco, Michoacán, Veracruz, Chiapas, Yucatán y Oaxaca. Además, cuanta con amplios reportes en los países centro y sudamericanos como Guatemala, Belice, El Salvador, Nicaragua, Cuba, Costa Rica, Panamá, Haití, Dominica, Granada, Trinidad y Tobago, Jamaica, Venezuela, Colombia, Ecuador, Perú y Brasil.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´07´´N 89°39´10´´W, 10 m,06-ago-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1977).

***Tylozygus geometricus* (Signoret, 1854)**

Tettigonia geometrica Signoret, 1854: 12.
Tettigonia atrovirens Lethierry, 1890: 157.
Tettigonia psittacella Fowler, 1900: 290.
Kolla geometrica Distant, 1908: 530.
Tettigoniella geometrica Osborn, 1909: 461.
Cicadella geometrica Lathrop, 1919: 32.
Kolla geometrica var. *plutoniella* Ball, 1936: 22.
Tylozygus geometricus Oman, 1949: 67.
Tylozygus atrovirens Metcalf, 1965: 448.

Presencia en los estados mexicanos de Jalisco, Tamaulipas, Veracruz, Chiapas y Yucatán. Reportada en Nicaragua, Estados Unidos, Honduras, Guatemala, El Salvador, Costa Rica, Panamá, Cuba, Santa Lucía, Dominica, Trinidad y Tobago, Venezuela, Colombia, Perú y Brasil.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´07´´N 89°39´10´´W, 10 m,06-ago-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1977).

Tribu Proconiini Stål

***Acrogonia nigriceps* (Signoret, 1855)**

Figura 1 A

Tettigonia nigriceps Signoret, 1855: 508.
Ciccus nigriceps Walker, 1858: 243.
Phera nigriceps Fowler, 1899: 222.

Se presenta el primer registro para México del estado de Yucatán. Se conoce de bosques lluviosos en Guatemala, Costa Rica, Panamá y Venezuela.

Material revisado: (1 macho, CEAM) Yucatán: Samahil, 20/I/2011, 10m, 20°84′48″ N, 89°89′28″ W, naranja. S. Patiño A.

Referencias: Young (1968) .

***Acrogonia obscurior* (Fowler, 1899)**

Figura 1 B

Phera obscurior Fowler, 1899: 224.
Tapajosa obscurior Melichar, 1924: 242.

Especie neotropical, aquí se presenta el primer registro para México en el estado de Yucatán. Registros previos la reportan en Guatemala, Colombia, Costa Rica y Perú.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´09´´N 89°39´21´´ W, 10 m,14-may-2022, Nah-Ramos, S. A. Col. Red entomológica. (1 macho, CEAM) Yucatán: Samahil, 20/I/2011, 10m, 20°84′48″ N, 89°89′28″ W, naranja. S. Patiño A.

Referencias: Young (1968)

***Egidemia anceps* (Fowler, 1899)**

Oncometopia anceps Fowler, 1899: 234.
Oncometopia (*Dichometopia*) *anceps* Melichar, 1925: 407.

Dichometopia anceps Schmidt, 1928:75.
Egidemia anceps Evans, 1947: 168.
Oncometopia (*Egidemia*) *anceps* Metcalf, 1965: 596.

Especies conocida de Veracruz y Yucatán, siendo este último estado donde fue descrita la especie por Young (1968). La especie está reportada en Guatemala, Honduras y Panamá.

Material revisado: (1 macho, CEAM) Yucatán: Samahil, 20/I/2011, 10m, 20°84′48″ N, 89°89′28″ W, naranja. S. Patiño A.

Referencias: Young (1968)

***Egidemia inflata* Young, 1968**

Egidemia inflata Young, 1968: 181.
Especie conocida de Veracruz y Yucatán, siendo este último estado donde fue descrita la especie por Young (1968). Reportada también en Belice y Cuba.

Material revisado: Yucatán: Oxkutzcab, Ticul, 30/XI/2010, 33 m, 20°24′49″ N, 89°51′51″ W, naranja, S. Patiño A.

Referencias: Young (1968)

***Oncometopia* (*Oncometopia*) *clarior* (Walker, 1851)**

Proconia clarior Walker, 1851b: 784.
Proconia obtusa clarior Walker, 1858: 225.
Oncometopia clarior Van Duzee, 1916: 65.
Oncometopia (*Oncometopia*) *viridula* Melichar, 1925: 384.

Tiene un rango de distribución muy amplio en México que comprende los estados de Tamaulipas, San Luis Potosí, Nayarit, Veracruz, Guerrero, Oaxaca, Tabasco, Chiapas, Campeche, Yucatán y Quintana Roo. La distribución general de esta especie comprende países neotropicales como Belice, Guatemala, Honduras, El Salvador, Costa Rica, Panamá, Colombia, Venezuela, Perú y Brasil.
Oncometopia clarior, comprende a un vasto complejo de especies con una significante variación tanto en la apariencia morfológica externa como la genital interna obstaculizando la segregación en diversas entidades válidas, por lo que futuros estudios poblacionales y genéticos desenmarañarán esta condición.

Plantas huéspedes conocidas: *Cucumis melo*, *C. sativus*, *Cucurbita*, *Glycine max*, *Phaseolus vulgaris*, *Vigna sinensis*, *Sesamum indicum*, *Z. mays*, *Citrus*, *Nicotiana tabacum*, *Lantana y L. camara*.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´07´´N 89°39´10´´W, 10 m, 30-abr-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1968)

***Homalodisca* ca. *ichthyocephala* (Signoret, 1854)**

Tettigonia ichthyocephala Signoret, 1854: 494
Proconia ichthyocephala Walker, F., 1858: 229
Homalodisca ichthyocephala Young, 1968: 196

Con mayor presencia sobre el norte del territorio nacional y se ha documentado en los estados de Tamaulipas, Baja California Norte, Jalisco, Yucatán y Coahuila. Está especie ha sido documentada pobremente y es de esperarse que su presencia pueda cubrir toda la región norte y centro de la nación. Su especie congenérica *H. ichthyocephala* (Signoret, 1854) tiene mayor presencia desde el centro-occidente hacia el sur en México, y con mayor proporción es encontrada en ambientes húmedos, a diferencia de *H. vitripennis* con afinidad a semiáridos. La distribución fuera de México de esta especie está limitada a la región sureste de los Estados Unidos.

Plantas huéspedes conocidas: *Acer rubrum*, *Amaranthus hybridus*, *A. spinosus*, *Mangifera indica*, *Rhus*, *Schinus terebinthifolius*, *Nerium oleander*, *Ilex*, *I. vomitoria, Brassaia actinophylla, Asclepias, Ambrosia artemisiifoli*a, *Erigeron canadensis*, *Eupatorium capillifolium*, *Eupatorium perfoliatum*, *Helianthus annus*, *Helianthus*, *Lactuca canadensis*, *Rudbeckia laciniat*a var. *hortensia*, *Solidago altissima*, *Solidago*, *Xanthium*, *Begonia, Campsis radicans*, *Catalpa, C.a bignonioide*s, *Spathodea campanulata*, *Sambucus canadensis, Casuarina*, *Chenopodium album*, *Clusia*, *Bucida buceras*, *Concarpus erectus*, *C. erectus*, *Ipomaea*, *Cycas*, *Elaeagnus*, *Aleurites fordii*, *Codiaeum variegatum*, *Ricinus comminis*, *Albizia julibrissin*, *Bauhinia punctata*, *Caesalpinia pulcherrima*, *Cassia occidentalis*, *Cassia tora*, *Cercis*, *Glycine max*, *M. sativa*, *Mimosa*, *Parkinsonia aculeata*, *Pisum*, *Psophocarpus tetragonolobus*, *Quercus virginiana*, *Tetragonolobus*, *Vigna sinensis*, *Wisteria*, *Quercus laevis*, *Quercus*, *Ginkgo biloba*, *Liquidambar styraciflua*, *Gladiolus*, *Carya illinoensis*, *Juglans regina*, *Monarda fistulosa*, *Persea americana*, *Sassafras albidum*, *Asparagus officinalis*, *Sansevieria*, *Yucca aloifolia*, *Lagerstroemia indica*, *Magnolia grandiflora*, *M. virginiana*, *Althaea rosea*, *Gossypium herbaceum*, *Hibiscus esculentus*, *Hibiscus rosa-sinensis*, *Melia azedarach*, *Swietenia mahagoni*, *Ficus, F. benjamina*, *Callistemon viminalis*, *Eucalyptus*, *Melaleuca quinquenervia*, *Myrtus communis*, *Psidium*, *Mirabilis jalapa*, *Nyssa sylvatica*, *Fraxinus*, *Jasminum primulinum*, *Ligustrum*, *Olea*, *Oenothera laciniata*, *Phytolacca americana*, *Pinus*, *Thuja*, *Pittosporum*, *Platanus*, *Pennisetum purpureum*, *Sorghum halepense*, *Z. mays*, *Leucadendron*, *Hemionitis arifolia*, *Cotoneaster*, *Malus*, *Malus sylvestris*, *Photinia*, *Prunus angustifolia*, *Prunus caroliniana*, *Prunus persica*, *Prunus*, *Pyracantha coccinea*, *Pyracantha*, *Pyrus communi*, *Pyrus*, *Rosa*, *Gardenia*, *Citrofortunella microcarpa*, *C. mitis*, *Citrus limon*, *Citrus*, *Fortunella*, *Populus*, *Salix*, *Mimusops roxburghiana*, *Camellia japonica*, *Ampelopsis arborea*, y *Vitis*.

Material revisado: (1 macho, CEAM) Yucatán: Oxkutzcab, Ticul, 30/XI/2010, 33 m, 20°24′49″ N, 89°51′51″ W, naranja. S. Patiño A.

Referencias: Young (1968)

***Phera obtusifrons* Fowler, 1899**

Phera obtusifrons Fowler, 1899: 223.
Oncometopia (*Dichometopia*) *obtusifrons* Melichar, 1925: 410.
Homalodisca obtusifrons Schmidt, 1928: 56.

Oncometopia obtusifrons Painter, 1955: 37.
Oncometopia (*Egidemia*) *obtusifrons* Metcalf, 1965: 597.

México reporta pocos hallazgos de esta especie sobre los estados de San Luis Potosi, Chiapas, Campeche y Yucatán. Distribución reportada también para Colombia, Costa Rica, El Salvador, Guatemala, Nicaragua y Venezuela.

Plantas huéspedes conocidas: *Elaeis guineensis*, *Ananas comosus*, *M. esculenta*, *Glycine*, *P. americana*, *Cenchrus*, *O. sativa*, *Oryza*, *Sorghum*, *S. vulgare*, *Zea* y *C. arabica*.
Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´07´´N 89°39´10´´W, 10 m, 01-oct-2022 Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1968)

***Pseudophera atra* (Walker, 1851)**

Proconia atra Walker, 1851: 789.
Tettigonia atra Signoret, 1854: 492.
Phera atra Stål, 1864: 78.
Pseudophera atra Melichar, 1925: 333.

México reporta registros en Yucatán y Quintana Roo. Distribución reportada también para Honduras.

Material revisado: (1 macho, CNIN) México: Yucatán, Unión, Ticul, 31/V/2012, 33 m 20°33′53″ N, 89°43′56″ W naranja, S. Patiño A.

Referencias: Young (1968)

Subfamilia Iassinae Walker, 1870
Tribe Gyponini Stål, 1870

***Gyponana* (*Gyponana*) *pingua* DeLong, 1942**

Figura 1 D

Gyponana pingua DeLong, 1942: 37.
Gyponana (*Gyponana*) *pingua* Oman, 1949: 46.

Primer registro para México sobre el estado de Yucatán. Se presenta una extensión de distribución significativa posiblemente por la vertiente del Golfo de México, no ha sido localizada en la cercana de los límites geográficos al norte de México en algún otro reporte desde hace 81 años. Distribución previa conocida en los Estados Unidos.

Material revisado: (1 macho, CEAM) Yucatán: Unión, Ticul, 15/III/2012, 25 m, 20°33′53″ N, 89°43′56″ W, limón. S. Patiño A.

Referencias: Blanco-Rodríguez *et al.* (2022); Blanco-Rodríguez *et al.* (2015); Delong (1942)

Subfamilia Coelidiinae Dohrn, 1859
Tribu Teruliini Nielson, 1979

***Jikradia bispinosa* Nielson, 1979**

Figura 2 B

Jikradia bispinosa Nielson, 1979: 83

Distribución en México sobre los estados de Oaxaca, Tabasco, Morelos, Chiapas y Yucatán, este último como nuevo registro estatal. Esta especie también está presente en Guatemala.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´02´´N 89°39´02´´W, 10 m, 20-ago-2022, Nah-Ramos, S. A. Col., Red entomológica. (1 macho, CEAM) Yucatán: Unión, Ticul, 15/III/2012, 25 m, 20°33′53″ N, 89°43′56″ W, limón. S. Patiño A.

Referencias: Godoy y Nielson (1998)

***Jikradia melanota* (Spångberg, 1878)**

Figura 2 C

Jassus melanotus Spångberg, 1878: 19.
Coelidia melanota Oman, 1949: 55.
Jikradia melanota malanota Nielson, 1979: 86.
Jikradia melanota Nielson, Zach, Poggi & Nickel, 2014: 1380.

Reportes en México sobre los estados de Veracruz, Jalisco, Guerrero, Sinaloa, Puebla, San Luis Potosí, Oaxaca, Chiapas y nuevo registro para Yucatán. Se ha documentado su presencia en los Estados Unidos, Costa Rica, Honduras, Panamá, Guatemala, Ecuador, Bahamas, Nicaragua, El Salvador, Cuba y Bermudas.

Material revisado: (1 macho, CEAM) Yucatán: Unión, Ticul, 15/III/2012, 25 m, 20°33′53″ N, 89°43′56″ W, limón. S. Patiño A.

Referencias: Godoy y Nielson (1998)

Subfamilia Deltocephalinae Dallas, 1870
Tribu Athysanini

***Duocrassana longula* Pinedo-Escatel, Zahniser & Dietrich, 2016**

Figura 2 A

Duocrassana longula Pinedo-Escatel, Zahniser & Dietrich, 2016: 586.

Especie endémica mexicana, se presenta el primer registro para el estado de Yucatán y se conoce originalmente del estado de Oaxaca. Esta especie habita el bosque tropical seco adyacente a la sección de los Valles Central de Oaxaca actualmente está incluido bajo un estatus vulnerable de acuerdo con los estatutos de la Lista Roja al ser microendémica y contener una muy limitada distribución.

Material revisado: (1 macho, CNIN) MÉXICO: Yucatán, Progreso, Progreso, 21°14’50.6”N 89°36’46.3”W, 1m, 6 abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC168

Referencias: Pinedo-Escatel *et al.* (2016)

***Ollarianus insignis* DeLong, 1944**

Figura 3 B

Ollarianus insignis DeLong, 1944b: 396.

Registros en Veracruz, Guerrero, Jalisco, Morelos, Michoacán, Oaxaca y nuevo para el estado de Yucatán. Se conoce también por estar presente en la selva de Guatemala.

Material revisado: (1 macho, CNIN) MÉXICO: Yucatán, Motul, 6.6km Motul-Cacalchén, 21°03’18.5”N 89°15’38.3”W, 17m, 5 abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC167 y (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´07´´N 89°39´10´´W, 10m, 11-dic-2021, Nah-Ramos, S. A. Col. Red Entomológica.

Referencias: Pinedo-Escatel *et al.* (2021c)

***Ollarianus sexmaculatus* Linnavuori, 1959**

Figura 1 E

Ollarianus sexmaculatus Linnavuori, 1959: 294.

Primer registro para México y primer registro para el estado de Yucatán. Esta especie se conocía únicamente para Colombia, a su vez aquí evidenciamos una extensión significativa de su distribución entre los corredores biológicos que conectan los bosques tropicales de Centroamérica.

Material revisado: (1 macho, CNIN) MÉXICO: Yucatán, Progreso, Progreso, 21°14’50.6”N 89°36’46.3”W, 1m, 6 abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC168

Referencias: Pinedo-Escatel *et al.* (2021c)

***Neocrassana punctiger* Linnavuori, 1959**

Figura 1 C

Neocrassana punctiger Linnavuori, 1959: 287.

Primer registro para México y primer registro para el estado de Yucatán. Esta especie se había reportado en Panamá y desde su descripción hace 64 años no se había vuelto a colectar por lo que disponemos el segundo registro conocido en el país.

Material revisado: (Holotipo macho, USNM) PANAMA: Barro Colorado Island, 24-V-1940, Zetek, J. Coll. y (1 macho, CNIN) MÉXICO: Yucatán, Valladolid, SEP-CBTA No 87, 3km de Valladolid, 20°39’14.4”N 88°12’56.5”W, 24m, 8 Abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC169

Referencias: Pinedo-Escatel *et al.* (2021c)

Tribu Scaphytopiini Oman

***Scaphytopius* (*Convelinus*) *fuliginosus* (Orborn, 1923)**

Platymetopius fuliginosus Osborn, 1923: 34.
Scaphytopius fuliginosus Oman, 1938: 368.
Cloanthanus fuliginosus DeLong, 1943: 173.

Se reporta en México en Veracruz y Yucatán. Se conoce también de los países Colombia, Costa Rica y Puerto Rico.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´07´´N 89°39´10´´W, 10m, 11-dic-2021, Nah-Ramos, S. A. Col. Red Entomológica.

Referencias: Hepner (1947)

Tribu Deltocephalini

***Graminella comata* (Ball, 1900)**

Figura 2 E

Deltocephalus comatus Ball, 1900: 343.
Thamnotettix comata Van Duzee, 1907: 69.
Thamnotettix comatus Van Duzee, 1916: 74.
Unerus comatus DeLong & Caldwell, 1937: 34.
Graminella comata Metcalf, 1967: 862.

Especie con distribución en México sobre los estados de Jalisco, Michoacán, Guerrero, Estado de México, Zacatecas, y nuevo registro para Yucatán. Se ha reportado también en Brasil, Costa Rica, Guatemala, Jamaica y Estados Unidos.

Material revisado: (1 macho, CNIN) MÉXICO: Yucatán, Valladolid, SEP-CBTA No 87, 3km de Valladolid, 20°39’14.4”N 88°12’56.5”W, 24m, 8 abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC169 y (1 macho, CNIN) MÉXICO: Yucatán, Progreso, Progreso, 21°14’50.6”N 89°36’46.3”W, 1m, 6 Abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC168.

Referencias: Kramer (1965)

***Graminella sonora* (Ball, 1900)**

Deltocephalus sonorus Ball, 1900: 344.
Deltocephalus spinosus Gibson, 1919: 26.
Deltocephalus (*Deltocephalus*) *sonorus* DeLong, 1926: 86.
Amplicephalus (*Amplicephalus*) *sonorus* Linnavuori, 1959: 113.

Con reportes en México sobre los estados de Jalisco, Michoacán y Estado de México, Guanajuato, Veracruz, Yucatán, Oaxaca, Chiapas y San Luis Potosí. Se ha documentado en países como Bahamas, Costa Rica, Cuba, Haití, Honduras, Estados Unidos, y Puerto Rico.

Material revisado: (1 macho, CNIN) MÉXICO: Yucatán, Progreso, Progreso, 21°14’50.6”N 89°36’46.3”W, 1m, 6 abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC168

Referencias: Kramer (1965)

***Amblysellus necopinus* DeLong & Hamilton, 1974**

Figura 2 D

Amblysellus necopinus DeLong & Hamilton, 1974: 845.

Especie endémica mexicana, registrada para Veracruz, Jalisco, Morelos, Oaxaca, Michoacán, Hidalgo y nuevo registro para el estado de Yucatán.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´02´´N 89°39´02´´W, 10m, 28-may-2022, Nah-Ramos, S. A. Col. Red Entomológica.

Referencias: Pinedo-Escatel *et al.* (2020)

***Planicephalus flavicosta* (Stål, 1862)**

Jassus (*Deltocephalus*) *flavicosta* Stål, 1862: 53.
Deltocephalus retrorsus Osborn, 1891: 197.
Deltocephalus harrisii Osborn, 1892: 126.
Deltocephalus flavicosta Baker, 1897: 117.
Deltocephalus senilis Van Duzee, 1907: 67.
Deltocephalus contestus Valdés Ragués, 1910: 445.
Deltocephalus pellucidus Osborn, 1926c: 346.
Deltocephalus (*Deltocephalus*) *flavicosta* DeLong, 1926: 86.
Deltocephalus (*Planicephalus*) *flavicosta* Linnavuori, 1954: 143.

Los reportes de esta especie son escasos de manera documentada en el país, sin embargo, la distribución estaría en la totalidad del territorio mexicano sin primicia, siendo una especie altamente dispersa en múltiples ambientes desde Norte hasta Sudamérica. En otros países reportada son Argentina, Bahamas, Bolivia, Brasil, Canadá, Costa Rica, Cuba, Guatemala, Jamaica, Paraguay, Estados Unidos y Puerto Rico.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´07´´N 89°39´10´´W, 10m, 27-nov-2021, Nah-Ramos, S. A. Col. Red Entomológica. (1 macho, CNIN) MÉXICO: Yucatán, Progreso, Progreso, 21°14’50.6”N 89°36’46.3”W, 1m, 6 Abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC168

Referencias: Kramer (1965)

Tribu Stenometopiini Baker, 1923

***Stirellus bicolor* (Van Duzee, 1892)**

Athysanus bicolor Van Duzee, 1892: 114.
Athysanus obtutus Van Duzee, 1892: 307.
Deltocephalus virgulatulus Van Duzee, 1894: 294.
Athysanus (*Stirellus*) *bicolor* Osborn & Ball, 1902: 250.
Phrynomorphus bicolor Barber, 1914: 534.
Euscelis (*Stirellus*) *bicolor* Van Duzee, 1916: 72.
Euscelis bicolor Lathrop, 1917: 125.
Stirellus bicolor Sleesman, 1929: 125.
Athysanus bicolor Essig & Usinger, 1940: 164.

Especie con distribución en toda la república mexicana, sin embargo, ha sido pobremente documentada. Presenta varios morfotipos ya sean semi-braquípteros, macrópteros o supra-macropteros por estacionalidad, ambiente, planta anfitrión o altitud donde sea colectado. Se reporta en Brasil, Colombia, Costa Rica, Cuba, Guatemala, Haití, Honduras, Panamá, Suriname y Venezuela.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´11´´ N 89°39´23´´W, 10 m, 19-abr-2022, Nah-Ramos, S. A. Col. Red Entomológica; (1 macho, CNIN) MÉXICO: Yucatán, Progreso, Progreso, 21°14’50.6”N 89°36’46.3”W, 1 m, 6 abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC168

Referencias: Sleesman (1929)

Tribe Chiasmini Distant, 1908

***Exitianus nigrens* DeLong & Hershberger, 1947**

Figura 3 C

Exitianus nigrens DeLong & Hershberger, 1947: 115.

Especie endémica mexicana reportada en los estados de Veracruz y primer registro para Yucatán.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´09´´N 89°39´21´´ W, 10 m ,03-sep-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: DeLong y Hershberger (1947)

***Exitianus picatus* (Gibson, 1919)**

Figura 3 D

Athysanus picatus Gibson, 1919: 26.
Athysanus miniaturatus Gibson, 1919: 26.
Exitianus picatus Ball, 1936: 71.

Registrada en México en los estados de Guerrero, Morelos, Veracruz, San Luis Potosí, Ciudad de México, Michoacán y primer registro para Yucatán. Además, se ha registrado en Costa Rica, Guatemala, Haití, Honduras y Estados Unidos.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´07´´N 89°39´10´´W, 10 m, 03-sep-2022, Nah-Ramos, S. A. Col. Red entomológica.

Referencias: DeLong y Hershberger (1947)

Tribu Acinopterini Oman, 1943

***Acinopterus acuminatus* Van Duzee, 1892**

Acinopterus acuminatus Van Duzee, 1892: 308.

Registros en Jalisco, Michoacán, Estado de México, Sonora, Zacatecas y Yucatán. Se ha reportado esta especie neártica de manera abundante en sistemas de pastizales en el país. Reportada comúnmente en Colombia, Cuba, Guatemala, Jamaica, Puerto Rico y Estados Unidos. Se sugiere que los registros sudamericanos se pueden tratar de la especie *A. angulatus* Lawson, 1922 y no a los registros referidos a esta especie.

Material revisado: (1 macho, CNIN) MÉXICO: Yucatán, Progreso, Progreso, 21°14’50.6”N 89°36’46.3”W, 1m, 6 abril 2019, Pinedo-Escatel Col.Trampa de Luz - MEXYUC168 y (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´09´´N 89°39´21´´ W, 10 m, 11-dic-2021, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Linnavuori y DeLong (1977)

***Acinopterus angulatus* Lawson, 1922**

Cicada reticulata Fabricius, 1794: 44.
Cicada smidtii Turton, 1802: 597.
Acinopterus angulatus Lawson, 1922: 119.
Acinopterus spatiosus Lawson, 1930: 136.

Reportada en Morelos, Hidalgo, Sonora, Ciudad de México, Jalisco, Michoacán, Guerrero, Chiapas, Puebla, San Luis Potosí, Estado de México, Yucatán y Veracruz. A su vez es reportada en Brasil, Panamá, Cuba, Argentina, Jamaica, Puerto Rico Bahamas, Belice, Bolivia, Chile, Colombia, Costa Rica, Cuba, República Dominicana, Ecuador, Guyana, Haití, Honduras, Nicaragua, Paraguay, Perú, Suriname, Uruguay, Venezuela, Guyana Francesa y Estados Unidos.

Material revisado: (1 macho, CNIN) MÉXICO: Yucatán, Progreso, Progreso, 21°14’50.6”N 89°36’46.3”W, 1m, 6 abril 2019, Pinedo-Escatel Col., Trampa de Luz - MEXYUC168

Referencias: Linnavuori y DeLong (1977)

Subfamilia Megophthalminae Kirkaldy, 1906

Tribu Agallini Kirkaldy, 1901

***Agallia constricta* Van Duzee, 1894**

Agallia constricta Van Duzee, 1894: 90.
Agallia (*Agallia*) *constricta* Lawson, 1920: 49.

Se conoce en México en los estados de Jalisco, Michoacán, Yucatán y Veracruz. Reportada ampliamente en cultivares de Estados Unidos y Cuba.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´09´´N 89°39´21´´ W, 10 m,14-may-2022, Nah-Ramos, S. A. Col. Red Entomológica.

Referencias: Oman (1933)

Subfamilia Neocoelidiinae Oman, 1943
Tribe Neocoelidiini Oman, 1943

***Neocoelidia barretti* Baker, 1898**

Figura 3 F

Neocoelidia barretti Baker, 1898: 291.
Stenocoelidia barretti DeLong, 1953: 104.
Stenocoelidia (*Eurycoelidia*) *barretti* DeLong, 1953: 118.

En México se reporta en los estados de Jalisco, Michoacán y nuevo para Yucatán. Distribuida en Estados Unidos y Guatemala.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´11´´ N 89°39´23´´W, 10 m, 30-oct-2021, Nah-Ramos, S. A. Col., Red Entomológica.

Referencias: DeLong (1953)

***Neocoelidia mexicana* (DeLong, 1953)**

Figura 3 E

Paracoelidea mexicana DeLong, 1953: 102.

Especies endémica mexicana reportada en Michoacán, Puebla y nuevo registro para Yucatán. Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´02´´N 89°39´02´´W, 10 m, 27-nov-2021, Nah-Ramos, S. A. Col., Red Entomológica.

Referencias: Knull (1942); Kramer (1964)

Subfamilia Typhlocybinae Kirschbaum, 1868
Tribu Alebrini McAtee, 1926

***Protalebrella brasiliensis* (Baker, 1899)**

Protalebra brasiliensis Baker, 1899: 405.
Protalebrella brasiliensis Young, 1952: 39.

Distribución conocida en México sobre Jalisco, Michoacán, Veracruz y Yucatán. Se ha reportado en Argentina, Barbados, Bolivia, Brasil, Colombia, Cuba, República Dominicana, Ecuador, Grenada, Guatemala, Honduras, Trinidad y Tobago, Jamaica, Panamá, Paraguay, Estados Unidos, Islas Virgenes, Venezuela y Puerto Rico.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´02´´N 89°39´02´´W, 10 m, 27-nov-2021, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1957)

***Trypanalebra balli* Young, 1957**

Trypanalebra balli Young, 1957: 156.

Se conoce en México en los estados de Jalisco, Veracruz y Yucatán. Descrita en Estados Unidos.

Material revisado: (1 macho, CNIN) México: Yucatán, Mérida, San José Tzal, 20°50´02´´N 89°39´02´´W, 10 m, 23-jul-2022, Nah-Ramos, S. A. Col., Red entomológica.

Referencias: Young (1957)

AGRADECIMIENTOS

Agradecemos profundamente a los curadores de las colecciones visitadas por su apoyo en la revisión de los materiales estudiados. A los revisores anónimos por mejorar sustancialmente este manuscrito. A Harry Brailovsky, Cristina Mayorga y Alejandro Zaldívar por permitir revisar el material que se resguarda en la CNIN. A Jesús Romero Nápoles por darnos acceso a los materiales en la CEAM.

LITERATURA CITADA

Abrajan-del Rio, X., , L.R. Reveles-Torres, R. Velásquez-Valle, M. Reveles-Hernández y J.Á. Cid-Rios. 2014. Presencia de fitoplasma en el cicadélido *Circulliffer tenellus* en el estado de Zacatecas, México. *Agrofaz* 14(3): 19-23.

Anufriev, G.A. y A.F. Emeljanov. 1988. Suborder Cicadinea (Auchenorrhyncha) (pp. 1–496.). En: Lehr, P.A. (Ed.) K*eys to the Insects of the Far East of the USSR. Homoptera and Hemiptera*. Nauka Publishing House, Moscow.

Backus, E.A. 1988. Sensory systems and behaviours which mediate hemipteran plant-feeding: a taxonomic overview. *Journal of Insect Physiology*, 34(3): 151-165. https://doi.org/10.1016/0022-1910(88)90045-5

Backus, E.A., M.S. Serrano y C. M. Ranger.. 2005. Mechanisms of hopperburn: an overview of insect taxonomy, behavior, and physiology. *Annual Review of Entomology*, 50, 125-151. https://doi.org/10.1146/annurev.ento.49.061802.123310

Bartlett, C.R., L.L. Deitz, D.A. Dmitriev, A. Sanborn, A. Soulier-Perkins y M.S. Wallace. 2018. The Diversity of the True Hoppers (Hemiptera: Auchenorrhyncha) (pp. 501-590). En: Foottit R.G. y Adler P H. (Eds.). *Insect Biodiversity: Science and Society*. *Vol. II.* Wiley-Blackwell, West Sussex, UK.

Blanco-Rodríguez, E., J. Romero-Nápoles, J.R. Lomelí-Flores, G. Mora-Aguilera y C. Dietrich. 2015. Cicadélidos asociados a cítricos en la península de Yucatán, México. *Entomologia Mexicana*, 2: 830-834.

Blanco-Rodríguez, E., J. Romero-Nápoles, J.R. Lomelí-Flores, G. Mora-Aguilera y C.H. Dietrich. 2022. Leafhoppers associated with citrus orchards on the Yucatan Peninsula, Mexico. *Southwestern Entomologist*, 47(1): 97-106. https://doi.org/10.3958/059.047.0108

Burdine, J. D., G. H. Domínguez Martínez y S.M. Philpott. 2014. Predictors of leafhopper abundance and richness in a coffee agroecosystem in Chiapas, Mexico. *Environmental Entomology*, 43(2): 328-335. https://doi.org/10.1603/EN13251

Catanach, T.A., C.H. Dietrich y J.B. Woolley. 2013.A revision of the New World sharpshooter genus *Xyphon* Hamilton (Hemiptera: Cicadellidae: Cicadellinae). *Zootaxa* 3741(4), 490–510.

DeLong, D.M. 1942. A monographic study of the North American species of the subfamily Gyponinae (Homoptera-Cicadellidae) exclusive of *Xerophloea*. Ohio State University, Columbus, xiv:187 pp. XXXV pls.

DeLong, D.M. y R.V. Hershberger. 1947. The genus *Exitianus* in North America including Mexico (Homoptera: Cicadellidae). *The Ohio Journal of Science*, 47(3): 107-116

DeLong, D.M. 1953. A synopsis of the tribe Neocoelidinii in the Americas (Homoptera-Cicadellidae). *Lloydia*, 16, 93–131.

Dietrich, C.H. 2005. Keys to the families of Cicadomorpha and subfamilies and tribes of Cicadellidae (Hemiptera: Auchenorrhyncha). *Florida Entomologist*, 88(4): 502–517. https://doi.org/10.1653/0015-4040(2005)88[502:KTTFOC]2.0.CO;2

Dietrich, C.H. 2009. Auchenorrhyncha:(cicadas, spittlebugs, leafhoppers, treehoppers, and Planthoppers) (pp. 56-64). En: Resh, V.H y Cardé, R.T. (Eds.). *Encyclopedia of insects*. Academic Press, United States.

Dmitriev, D.A. 2010. Homologies of the head of Membracoidea based on nymphal morphology with notes on other groups of Auchenorrhyncha (Hemiptera). *European Journal of Entomology*, 107(4): 597–613.

Godoy, C. y M.W. Nielson. 1998. A review of the leafhopper genus *Jikradia* with descriptions of four new species (Homoptera: Cicadellidae). *Revista de Biología Tropical*, 46(3): 739-748.

Hepner, L.W. 1946. A revision of the tribe Scaphytopini (Homoptera, Cicadellidae) in America north of Mexico. *The University of Kansas Science Bulletin,* 31(16): 413-541.

Kramer, S. 1950. *The morphology and phylogeny of auchenorhynchous Homoptera (Insecta)*. University of Illinois Press, United States.

Kramer, J.P. 1964. A generic revision of the leafhopper subfamily Neocoelidiinae (Homoptera: Cicadellidae). *Proceedings of the United States National Museum*, 115(3484): 259-287.

Kramer, J.P. 1965. New species of Deltocephalinae from the Americas (Homoptera: Cicadellidae). *Proceedings of the Biological Society of Washington*, 78: 17-31.

Knull, D.J. 1942. The genus *Neocoelidia* in the United States (Homoptera: Cicadellidae). *The American Midland Naturalist*, 28(3): 680-692.

Linnavuori, R.E. y D.M. DeLong. 1977. The genus *Acinopterus* (Homoptera: Cicadellidae) in Mexico and the Neotropical Region. *Entomological News* 88:249-254

López-Collado, J., J.I. López-Arroyo, P.L. Robles-García y M. Márquez-Santos. 2013. Geographic distribution of habitat, development, and population growth rates of the Asian citrus psyllid, *Diaphorina citri*, in Mexico. *Journal of Insect Science*, 13(1): 1-17. https://doi.org/10.1673/031.013.11401

Medler, J.T. 1960. *Agrosoma*, a new genus for *Tettigonia Pulchella* Guerin and related species (Homoptera: Cicadellidae). *Annals of the Entomological Society of America*, 53: 18–26.

Medler, J.T. 1963. A review of the genus *Erythrogonia* Melichar (Homoptera, Cicadellidae). *Miscellaneous Publications of the Entomological Society of America*, 4: 1–33

Metcalf, Z.P. 1962. *General catalogue of the Homoptera. Fascicle VI. Cicadelloidea*. Washington, D.C. USDA.

Nault, L.R. y E. D. Ammar. 1989. Leafhopper and planthopper transmission of plant viruses. *Annual Review of Entomology*, 34(1): 503-529. https://doi.org/10.1146/annurev.en.34.010189.002443

Nielson, M.W. 1968. *The leafhopper vectors of phytopathogenic viruses (Homoptera, Cicadellidae): taxonomy, biology, and virus transmission*. U.S. Agricultural Research Service.

Nottingham, J.O. 1932.The genus *Carneocephala* (Homoptera, Cicadellidae). *Journal of the Kansas Entomological Society*, 5: 97–115

Oman, P.W. 1933. A classification of North American Agallian leaf hoppers. *United States Department of Agriculture Technical Bulletin*, Washington, DC, 94 pp.

Oman, P.W. 1949. The Nearctic leafhoppers (Homoptera: Cicadellidae). A generic classification and check list. *Memoirs of the Entomological Society of Washington*, 3: 1-253.

Pinedo-Escatel, J.A. y G. Moya-Raygoza. 2015. Diversity of leafhoppers during the winter dry season on perennial grasses bordering harvested fields of maize. *Southwestern Entomologist*, 40(2): 263-272. https://doi.org/10.3958/059.040.0203

Pinedo-Escatel, J.A., J.N. Zahniser, C.H. Dietrich y G. Moya-Raygoza. 2016: *Duocrassana longula*, new genus and species of leafhopper (Hemiptera: Cicadellidae: Deltocephalinae) from southern Mexico and its relationship to other genera in Athysanini. *Zootaxa* 4196: 579-588

Pinedo-Escatel, J.A. y G. Moya-Raygoza. 2018. Diversity of leafhoppers (Hemiptera: Cicadellidae) associated with border grasses and maize during the wet and dry seasons in Mexico. *Environmental Entomology*, 47(2): 282-291. https://doi.org/10.1093/ee/nvx204

Pinedo-Escatel, J. A., I.M. Becerra-Chiron, R. Torres-Moreno y L.I. Pérez-Valencia. 2020. A new species of the grass-feeding leafhopper genus *Amblysellus* Sleesman (Hemiptera: Cicadellidae: Deltocephalinae) from western Mexico, with a checklist and key to species. *Zootaxa*, 4853(2): 292-300.

Pinedo-Escatel, J.A., J. Aragón-Parada, C.H. Dietrich, G. Moya-Raygoza, J.N. Zahniser y L. Portillo. 2021a. Biogeographical evaluation and conservation assessment of arboreal leafhoppers in the Mexican Transition Zone biodiversity hotspot. *Diversity and Distributio*ns, 27(6): 1051-1065. https://doi.org/10.1111/ddi.13254

Pinedo-Escatel, J.A., G. Moya-Raygoza, C.H. Dietrich, J.N. Zahniser y L. Portillo. 2021b. Threatened Neotropical seasonally dry tropical forest: evidence of biodiversity loss in sap-sucking herbivores over 75 years. *Royal Sociery Open Scienc*e, 8(3): 201370. https://doi.org/10.1098/rsos.201370

Pinedo-Escatel, J.A., Dietrich, C.H., Zahniser, J.N., Moya-Raygoza, G. y Portillo, L. 2021c. A dichotomous key and checklist for Mexican Athysanini leafhopper genera (Hemiptera: Cicadellidae) with a new species from the Oaxacan dry tropical forest. *European Journal of Entomology*, 118: 255–278. https://doi.org/10.14411/eje.2021.027

Oman, P.W., W.J. Knight y N.W. Nielson. 1990. *Leafhoppers (Cicadellidae): A bibliography, generic check-list and index to the world literature 1956–1985*. CAB International, Wallingford.

Sleesman, J.P. 1929. A monographic study of the North American species of *Euscelis* and allied genera. (Homoptera-Cicadellidae). Entomologica Americana (New Series), 10, 87–148.

Rakitov, R.A. 1998. On differentiation of cicadellid leg chaetotaxy (Homoptera: Auchenorrhyncha: Membracoidea). *Russian Entomological Journal*, 6: 7–27.

Young, D. A. 1957. The leafhopper tribe Alebrini (Homoptera, Cicadellidae). Proceedings of the United States National Museum, 107:127-277

Recibido: 2 de mayo 2023
Aceptado: 6 de julio 2023

Young, D.A. 1968. Taxonomic study of the Cicadellinae (Homoptera: Cicadellidae) Part 1. Proconiini. Bu*lletin of the United States National Museum*, 261: 1-287.

Young, D.A. 1977. Taxonomic study of the Cicadellinae (Homoptera: Cicadellidae). Part 2. New World Cicadellid and the genus *Cicadella*. *Technical Bulletin of North Carolina Agricultural Experiment Station*, 239: 1-1135.

Zanol, K.M.R. 2006. Catalogue of the Neotropical (including north of Mexico) Deltocephalinae (Hemiptera-Cicadellidae) Part I. Athysanini and Deltocephalini excluded. *Acta Biológica Paranaense*, 35(2–4): 89-161.

Zanol, K.M.R. 2007. Catalogue of the neotropical Deltocephalinae (Hemiptera: Cicadellidae). Part II. Tribe Deltocephalini. *Acta Biológica Paranaense*, 36 (1-2): 1-46.

Zanol, K.M.R. 2008. Catalogue of the Neotropical Deltocephalinae (Hemiptera: Cicadellidae). Part III–Tribe Athysanini. *Acta Biológica Paranaense*, 37: 1-104.

Zhang, Z.-Q. 2011. Phylum Arthropoda von Siebold, 1848 *En*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa* 3148 (1): 99-103. https://doi.org/10.11646/zootaxa.3148.1.14

Cuadro 1. Lista preliminar de subfamilias, tribus, géneros y número de especies presentes en el estado de Yucatán.

Subfamilia	Tribu	Género	Especie(s)
Cicadellinae	Cicadellini	*Agrosoma*	2
		Apogonalia	1
		Erythrogonia	3
		Graphogonalia	1
		Xyphon	2
		Draeculacephala	2
		Hortensia	1
		Sibovia	1
		Tylozygus	2
	Proconini	*Acrogonia*	2
		Egidemia	2
		Oncometopia	1
		Homalodisca	1
		Phera	1
		Pseudophera	1
Iassinae	Gyponini	*Gyponana*	1
Coelidiinae	Teruliini	*Jikradia*	2
Deltocephalinae	Athysanini	*Duocrassana*	1
		Ollarianus	2
		Neocrassana	1
	Scaphytopiini	*Scaphytopius*	1
	Deltocephalini	*Graminella*	2
		Amblysellus	1
		Planicephalus	1
	Stenometopiini	*Stirellus*	1
	Chiasmini	*Exitianus*	2
	Acinopterini	*Acinopterus*	2
Megophthalminae	Agallini	*Agallia*	1
Neocoelidiinae	Neocoelidiini	*Neocoelidia*	2
Typhlocybinae	Alebrini	*Protalebrella*	1
		Trypanalebra	1
	TOTAL	**31**	**45**

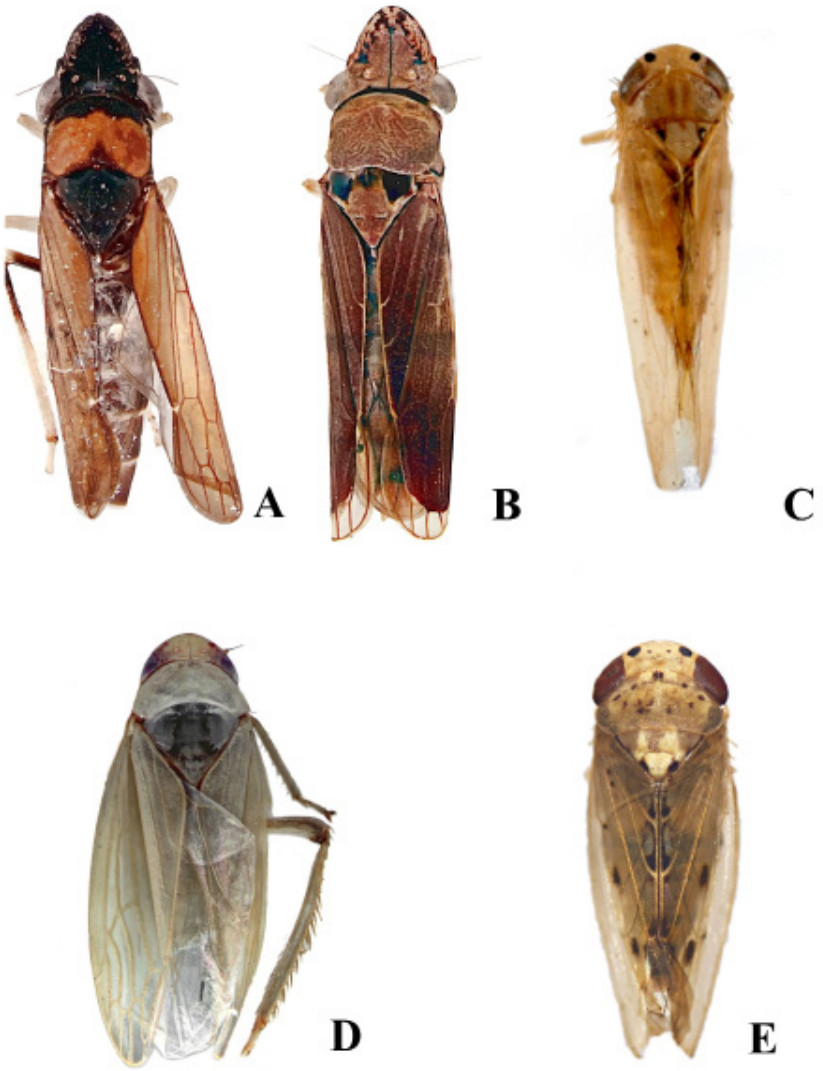


Figura 1. Nuevos registros de cicadélidos para México colectados en Yucatán. (**A**) *Acrogonia nigriceps* (Signoret, 1855); (**B**) *A. obscurior* (Fowler, 1899); (**C**), *Neocrassana punctiger* Linnavuori, 1959; (**D**) *Gyponana* (*Gyponana*) *pingua* DeLong, 1942; (**E**) *Ollarianus sexmaculatus* Linnavuori, 1959.

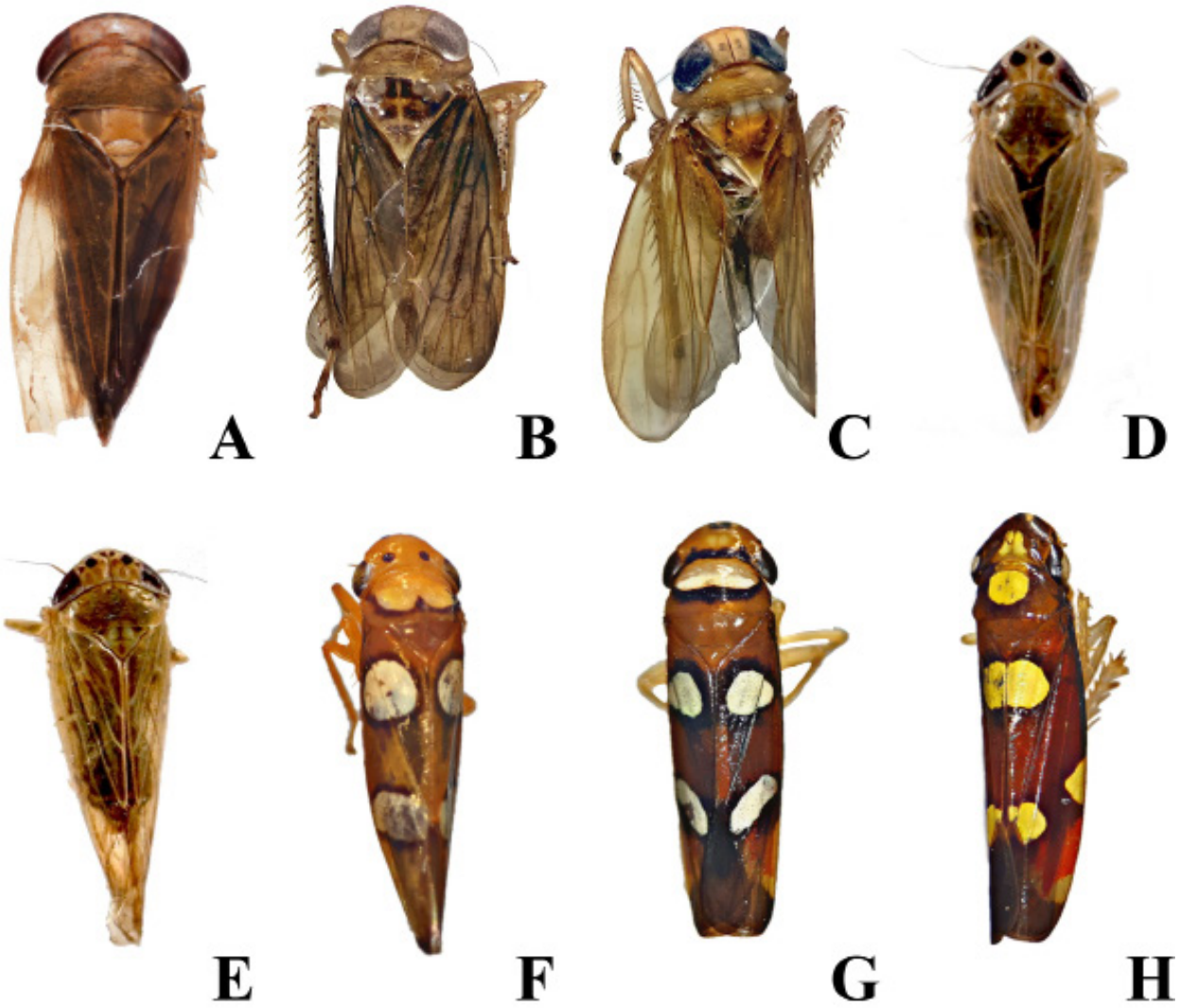


Figura 2. Nuevos registros de cicadélidos para el estado de Yucatán. (**A**) *Duocrassana longula* Pinedo-Escatel, Zahniser & Dietrich, 2016; (**B**) *Jikradia bispinosa* Nielson, 1979; (**C**) *J. melanota* (Spångberg, 1878); (**D**) *Amblysellus necopinus* DeLong & Hamilton, 1974; (**E**) *Graminella comata* (Ball, 1900); (**F**) *Erythrogonia execta* Medler, 1963; (**G**) *E. areolata* (Signoret, 1853); (**H**) *E. gossana* Medler, 1963.

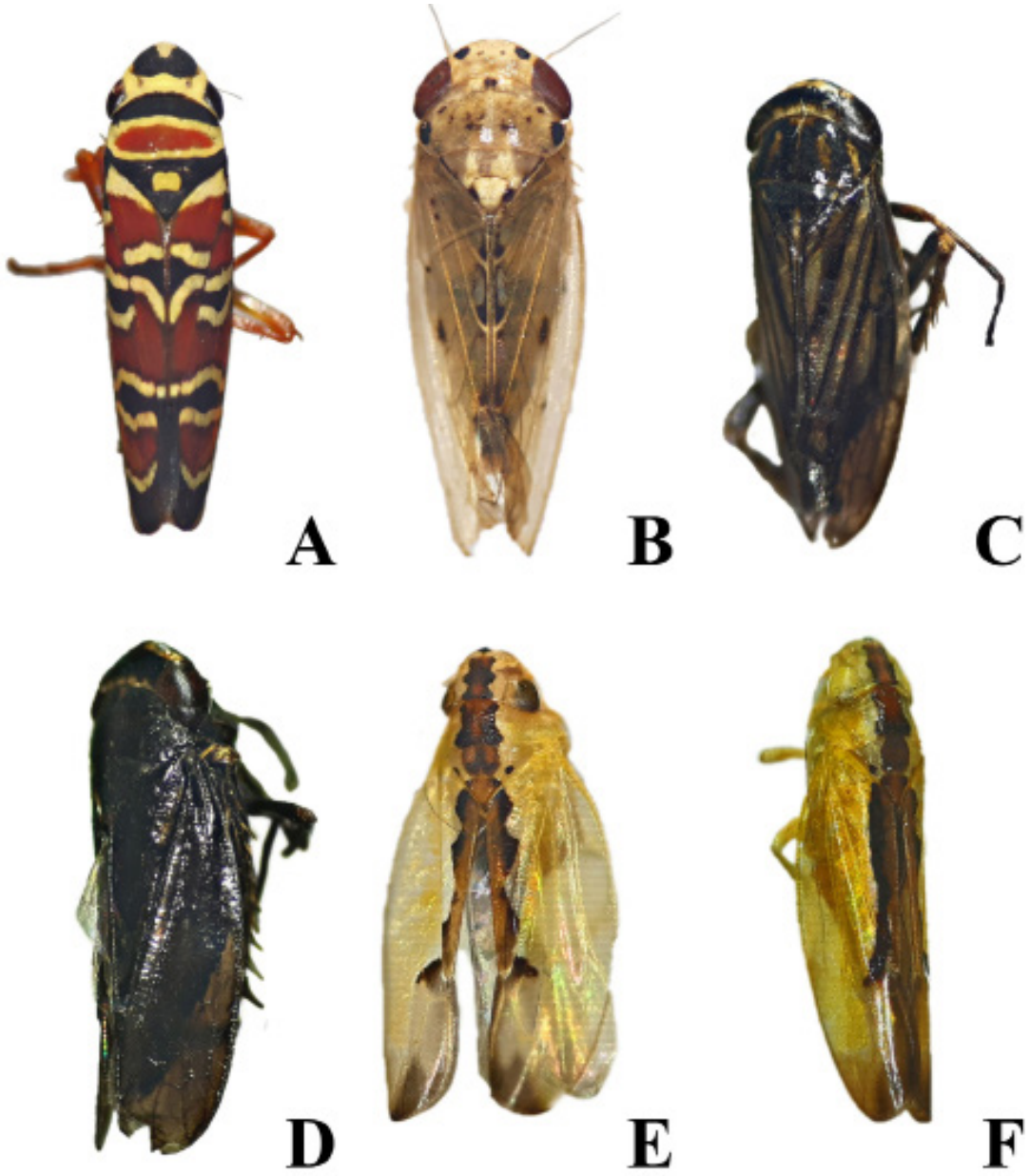


Figura 3. Nuevos registros de cicadélidos para el estado de Yucatán. (**A**) *Agrosoma pulchella* (Guérin-Méneville, 1829); (**B**) *Ollarianus insignis* DeLong, 1944; (**C**) *Exitianus nigrens* DeLong & Hershberger, 1947; (**D**) *E. picatus* (Gibson, 1919); (**E**) *Neocoelidia mexicana* (DeLong, 1953); (**F**) *N. barretti* Baker, 1898.

Dugesiana 31(1): 19-74
Fecha de publicación: 19 enero 2024

ISSN 1405-4094 (edición impresa)
ISSN 2007-9133 (edición online)
Artículo
http://zoobank.org/353865F1-0A8A-4260-9245-D573008DCAE9

The Western Hemisphere subgenus *Pinacodera* Schaum: *Cymindis* (*Pinacodera*) *latiuscula* subgroup (Coleoptera: Carabidae: Lebiini: *Cymindis* Latreille)

El subgénero *Pinacodera* Schaum del Hemisferio Oeste: Subgrupo *Cymindis* (*Pinacodera*) *latiuscula* (Coleoptera: Carabidae: Lebiini: *Cymindis* Latreille)

Gerald J. Hilchie and George E. Ball*
10629-64 Ave. NW, Edmonton, Alberta, CANADA. *Deceased

ABSTRACT

A taxonomic treatment of the *latiuscula* species subgroup of subgenus *Pinacodera* Schaum, genus *Cymindis* Latreille with a key to species. Twelve species and two subspecies are treated, eleven (ten species, one subspecies) are described as new. One species, *C. punctifera* (LeConte), is re-ranked as a subspecies of *C. punctifera* (*sensu lato*).

Listed alphabetically are the species and subspecies: *Cymindis apache*, **new species** (Ramsey Canyon, Cochise County, Huachuca Mountains, Arizona, U.S.A.)**;** *C. crenatoverpa*, **new species (**Volcán Ceboruco, Nayarit, México); *Cymindis cuyuteca* **new species** (Cuautla, Jalisco, México); *C. geminata*, **new species** (Cuernavaca, state of Morelos, México); *C. huichilobos*, **new species** (km 117, Oaxaca-Puerto Angel road, state of Oaxaca, México); *C latiuscula* (Chaudoir) (Dzibilchaltun Archaeological Zone, ca. 16 km north of Mérida, Yucatán, México); *C. punctifera punctifera* LeConte, **new rank** (Madera Canyon, Santa Rita Mountains, Pima County, Arizona, U.S.A.); *C. punctifera toltec,* **new subspecies** (Mazatlán, Sinaloa, México); C. *rugofrons,* **new species** (19.5 km NW Los Volcánes, Jalisco, México); *C. tonatiuh,* **new species** (15 km SE Nochixtlán, Oaxaca, México); *C. yaqui,* **new species** (Cave Creek Canyon, S. Fork, Chiricahua Mts., Arizona, U.S.A.); *C. zacapa* **new species** (12-14 km S. San Lorenzo, Departamento Zacapa, Guatemala); and *C. zapotec* **new species (**San Gabriel Mixtepec, Oaxaca, México).

Cymindis punctifera (LeConte 1884)*,* a junior synonym of *C. cribrata* (Chaudoir 1875), is the valid species name because the latter is a junior secondary homonym of *Cymindis cribrata* LeConte 1859 (= *C. pilosa* Say 1823).

Ecologically, the species of the *latiuscula* subgroup are geophile or arboreal mesophiles, occupying tropical wet and dry, oak- pine [lowland to montane], and cloud forests, to scrubby desert vegetation, their resting places are under bark or bromeliads.

These beetles are active in year-round, principally March to September. They may be found from sea level to 3060 m, with most found below 1800 m.

Key Words: Coleoptera, Carabidae, Lebiini, *Cymindis, Pinacodera*, taxonomy, biogeography.

RESUMEN

Se presenta una publicación taxonómica con claves dicotómicas a nivel de especies para el subgrupo de la especie *latiuscula* del subgénero *Pinacodera*, género *Cymindis* Latreille. La publicación se enfoca en 12 especies y dos subespecies; once (diez especies, una subespecie) son descritas como nuevas. Una especie, *C. punctifera* (LeConte), es reclasificada como subespecie de *C. punctifera* (*sensu lato*).

Las especies y subespecies, organizadas alfabéticamente, son: *Cymindis apache*, **nueva especie** (Cañón de Ramsey, Condado Cochise, Montaña Huachuca, Arizona, EE. UU.); *C*. *crenatoverpa*, nueva especie (Volcán Ceboruco, Nayarit, México); *C. cuyuteca*, **nueva especie** (Cuautla, Jalisco, México); *C. geminata*, **nueva especie** (Cuernavaca, Estado de Morelos, México); *C. huichilobos*, **nueva especie (**km 117, Carretera Oaxaca-Puerto Ángel, Estado de Oaxaca, México); *C latiuscula* (Chaudoir) (Zona Arqueológica Dzibilchaltun, ca. 16 km al norte de Mérida, Estado de Yucatán, México); *C. punctifera punctifera* LeConte, **nuevo rango** (Cañón de Madera, Montañas de Santa Rita, Condado Pima, Arizona, EE.UU.); *C. punctifera toltec,* **nueva subespecie** (Mazatlán, Sinaloa, México); C. *rugofrons,* **nueva especie** (19.5 km al NO de Los Volcanes, Jalisco, México); *C. tonatiuh,* **nueva especie** (15 km al SE de Nochixtlán, Oaxaca, México); *C. yaqui,* **nueva especie** (Cañón de Cave Creek, S. Fork, Chiricahua Mts., Arizona, EE.UU.); *C. zacapa*, **nueva especie** (12-14 km al S de San Lorenzo, Departamento Zacapa, Guatemala); and *C. zapotec*, **nueva especie (**San Gabriel Mixtepec, Oaxaca, México).

Cymindis punctifera (LeConte 1884)*,* un sinónimo menor de *C. cribrata* (Chaudoir 1875), es el nombre válido de la especie porque *C. cribrate* es homónimo secundario menor de *Cymindis cribrata* LeConte 1859 (= *C. pilosa* Say 1823).

Ecológicamente, las especies del subgrupo *latiuscula* son geófilas o mesófilas arbóreas, que ocupan vegetación de tipo tropical húmeda y seca, en robles y pinos de tierras bajas y montañosas, en bosque nuboso, hasta vegetación de arbustos desérticos; descansan debajo de corteza de árboles y bromelias.

Estos escarabajos son activos todo el año, principalmente desde marzo hasta septiembre. Se los puede encontrar desde nivel del mar hasta los 3060 m de altitud, y la mayoría se encuentra por debajo de los 1800 m de altitud.

Palabras clave: Coleoptera, Carabidae, Lebiini, Cymindis, Pinacodera, taxonomía, biogeografía.

This study, a taxonomic revision, is part of a more extensive project in which a revision of the entire subgenus *Pinacodera* Schaum is being undertaken. Ball and Hilchie (1983) redefined and reclassified the genera of cymindidine Lebiini, with the taxon *Pinacodera* placed as a subgenus of *Cymindis*. Examination of morphological features of the subgenus showed that the species could be organized in probably monophyletic assemblages (Hunting 2013: 13-14), one of which is the *latiuscula* subgroup. Its members, collectively, comprise a characteristic element of the drier forests and desert margins of Nuclear Middle America Mexican Transition Zone (Halffter 1987) and southwestern

United States. The adults are of moderate size (standardized body length: 6.9–9.7 mm) with body color ranging from rufous to piceous and surface of pronotum and elytra densely punctate and setose. They are frequently collected at light and in bromeliads, in tropical latitudes.

This study includes a key to the species, and characterization of each taxon in terms of structural features, habitat, and geographical distribution. A geographical history correlates the distribution pattern with what is known of geological, physiographical, and climatic change in Nuclear Middle America during the latter part of the Tertiary Period.

MATERIALS AND METHODS

More than 2400 specimens of the *Cymindis latiuscula* subgroup were examined, representing 12 named species and 2 subspecies. Most specimens were borrowed, but some are represented in the Strickland Museum, University of Alberta (UASM). Listed below, with codens used in the text, are names and addresses of the lending institutions and owners or institutional curators. In the text, specimen numbers for each sex are listed, males first, followed by number of females preceding the institution coden.

AMNH – American Museum of Natural History, Central Park West at 79 Street, New York, New York, U.S.A. 10024 (L. H. Herman).

ANSP – Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, Pennsylvania, U.S.A. 19103 (D. Otte).

CASC – Department of Entomology, California Academy of Sciences, 55 Music Concourse Drive, San Francisco, California, U.S.A. 94118 (D. H. Kavanaugh, retired).

CDAE – California Department of Agriculture, Plant Pest Diagnostics, 3294 Meadowview Road, Sacramento, California, U.S.A. 95832 (C. Bellamy, deceased.

CMNH – Carnegie Museum of Natural History, 440 Forbes Avenue, Pittsburg, Pennsylvania, U.S.A. 15213 (John Rawlins, Robert L. Davidson).

CMNC – Canadian Museum of Nature Collection, P.O. Box 3443, Station D, Ottawa, Ontario, Canada K1P 6P4 (R. S. Anderson, F. Génier).

CNCI – Canadian National Collection, Biosystematics and Research Institute, Agriculture Canada, K.W. Neatby Building, Ottawa, Ontario, Canada K1A 0C6 (Y. Bousquet).

CNIN – Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México, Apdo. Postal 70-133, 04510 México, D.F., México (Santiago Zaragoza Caballero).

CUNY – Insect Collection, Department of Entomology, Cornell University, 1 Hungerford Hill Road, Ithaca, New York, U.S.A. 14853 (J. K. Liebherr, R. Hoebeke retired).

EMEC – Essig Museum of Entomology, University of California, Berkeley, 201 Wellman Hall, #3112, Berkeley, California, U.S.A. 94720-3112 (K. W. Will; C. B. Barr).

FSCA – Museum of Entomology, Florida State Collection of Arthropods, 1911 SW 34th Street, Gainesville, Florida, U.S.A. 32608-1268 (M. C. Thomas retired, P. E. Skelley).

FMNH – Field Museum of Natural History, 1400 S. Lakeshore Drive, Chicago, Illinois, U.S.A. (H. Dybas)

GJHC – G. J. Hilchie collection, 10629-64 Avenue, Edmonton, Alberta, Canada, T6H 1T1.

JEWC – J. E. Wappes collection, J.E. Wappes, 8734 Paisano Pass, San Antonio, Texas U.S.A. 78255.

LACM – Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California, U.S.A. 90007 (B. V. Brown).

LSUC – Louisiana State University Collection, Louisiana State Arthropod Museum, Baton Rouge, Louisiana, U.S.A. 70803-1710 (C. E. Carlton).

MAIC – M. A. Ivie insect collection, M. A. Ivie, Entomology Research Laboratory, Montana State University, Bozeman, Montana, U.S.A. 59717-3020.

MCZC – Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A. 02138 (P. Perkins, B. D. Farrell).

MNHP – Entomologie, Museum National d'Historie Naturelle, 45 Rue Buffon, Paris 75005, France (T. Deuve).

MTEC – Montana State University Entomology Collection, Entomology Research Laboratory, Montana State University, Bozeman, Montana, U.S.A. 59717 (M. A. Ivie).

OSUC – Department of Entomology, Ohio State University, Columbus, Ohio, U.S.A. 43210 (N. F. Johnson).

PKLC – P. K. Lago collection, P. K. Lago, Department of Biology, University of Mississippi University, Mississippi, U.S.A. 38677.

RFMC – R. F. Morris II, collection, 2635 Ewell Road, Lakeland, Florida, U.S.A. 33811.

RHTC – R. H. Turnbow, Jr. collection, Robert H. Turnbow, Jr., 59 Brookview Ct., Enterprise, Alabama, U.S.A. 36330.

TAMU – Department of Entomology, Texas A & M University, College Station, Texas, U.S.A. 77843 (E. G. Riley).

UCRC – Entomology Research Museum, Department of Entomology, University of California, Riverside, California, U.S.A. 92521 (D. Yanega).

UASM – E. H. Strickland Entomology Museum, Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada T6G 2E9 (F.A.H. Sperling, D. Shpeley).

USNM – Department of Entomology, United States National Museum of Natural History, Smithsonian Institution, Washington, D.C. U.S.A. 20560 (T. L. Erwin).

WSUP – Department of Entomology, Washington State University, Pullman, Washington, U.S.A., 99163 (R. S. Zack).

ZMHB – Museum für Naturkunde der Humboldt-Universität zu Berlin, Invalidenstrasse 43, 10115 Berlin, Germany (M. Uhlig retired, F. Heike retired).

Taxonomic concepts, principles, criteria for ranking, and general working methods were the same as those described previously (Ball 1975, 1978; Allen and Ball 1980; Ball and Shpeley 2001).

Measurements: Characterization of the species employed a number of methods. One of these was standardized measurement of various body parts for comparative purposes. The measurements used in this paper are outlined

below:

Length of head **(HL)**, measured on left side from base of left mandible to the posterior margin of the compound eye.

Pronotum length **(PL)**, measured along the midline from anterior margin to basal margin.

Pronotum width **(PW)**, maximum width of the pronotum.

Elytron length **(EL)**, length of the longer elytron (if elytra of a single specimen were unequal) measured along the suture from the basal ridge to the apex.

Phallus, maximum length **(MLp),** maximum length from apex to base (Figure 2A).

Phallus, maximum width **(MWp)** maximum width measured near its middle (Figure 2A).

Phallus, maximum displacement, a measurement of curvature **(MDp)**, maximum distance measured from a line connecting the apex and base to a point farthest from the line on the phallus, about midway, used as an index of curvature (Figure 2A).

Phallus, distal portion **(DPp),** maximum length of distal (preapical) portion of the phallus

Standardized body length **(SBL),** expressed as the sum of **HL** + **PL** + **EL**, is used as an index of overall size (Table 2). The ratio **PL/PW** (Table 3) indicates relative width of the pronotum; higher values indicate narrower, with lower values indicating broader. The phallic measurements, **MLp, MWp, MDp, and DPp** are recorded in Tables 4-7, respectively. The data in Tables 2-7 are sequenced according to mean values, from high to low. This places in juxtaposition the species most similar for the measurement in question.

Preparation of material. Studies of male genitalia involved removal of the organ (Lindroth 1969), examination, then preservation in glycerin and storage in microvials, pinned through the stopper beneath the specimen from which they were removed. Larger structures and those that were gold-coated for study with the Scanning Electron Microscope (SEM), were glued to cards pinned beneath the specimens from which they were removed.

Photographs of some isolated structures were taken with a JEOL JSM 6301 FXV field emission stereo electron microscope (SEM). Specimens were cleaned using a sonicator and were gold plated. Photographs (habitus and body parts) were taken with a Nikon Coolpix camera mounted on a Wild M5 stereo binocular microscope. The resulting images were stitched together using the image-handling program Automontage. Plates were prepared using Adobe Photoshop 7.0.

Measurements were made with a Wild M3C stereo binocular microscope at 16X, 25X and 40X. Line drawings of selected body parts were prepared by using a camera lucida on a Wild W5 stereoscopic microscope.

Recognition. Criteria for recognizing taxa were based primarily on differences in structural features. Habitat data and geographic distribution were used when appropriate.

Descriptions. To reduce repetition, character states of lower ranking taxa recorded in the descriptions of higher-ranking taxa are not repeated in the descriptions. Thus, the complete description of a species must be assembled from its taxonomic placement. Such a description may be obtained by reading the descriptions and diagnoses of the sequence of higher-ranking taxa in which the lower-ranking taxon is placed.

Habitat, habits and seasonal occurrence. For each species, a section thus entitled summarizes the label data available, with "habitat" indicating primarily forest type and elevation. "Habits" summarize data about way of life. "Seasonal occurrence" indicates months of the year during which the specimens were collected.

Relationships. A general mental analysis for the *latiuscula* subgroup was done (Figure 32). Notes on relationships were made taking in account morphological similarity and geographical distribution.

Specific ranking. Species are clusters of morphologically similar adults, distinguished from other clusters by discontinuity in one or more structural features, with emphasis on form and structure of the phallus and/or gonocoxa. We expect that the discontinuity between morphologically similar clusters will be reflected in features of other life stages. Further, we expect that the clusters we recognize as distinct are reproductively isolated from each other. Expressed in the fashion of Hennig (1966), the tokogenetic relations that previously connected these clusters have been interrupted. Thus, we accept the (now) classical "biological" species definition, as formulated and defended over the years by Mayr (1942). See also Darlington (1980).

Subspecific ranking. Subspecific ranking is a contentious issue. Where does one draw the line between species and subspecies? For one species treated, we recognize two subspecies. Phenotypically, most individuals can be placed in one or the other taxon, but a few populations appear mixed to some extent. Differences in habitat preferences can be extrapolated from elevation data where known. For reasons of convenience, we follow Willis (1967) "If a subspecies reflects to some degree the actual pattern of variation, as well as being convenient 'handles' for reference, their value seems sufficient to justify their recognition."

Supraspecific ranking. We have adopted a broad generic concept to make this categorical level useful to a wide variety of biologists rather than restricting it, so that its value is limited to carabid specialists (Lindroth 1969: XVII). Thus, *Pinacodera* is treated as a subgenus of *Cymindis* (sensu lato) (Ball and Hilchie 1983: 149-154**)**. Clusters of species of *Pinacodera* are evident, based on features that may be synapotypic, and are so postulated. To designate these putative monophyletic clusters, the taxonomically informal category used is species group.

Label data. For holotypes and lectotypes, the information on each label is reproduced as exactly as is possible using ordinary type. Information on each label is enclosed in quotation marks. As well, a double slash mark (//) marks the end of a label. A single slash mark (/) indicates the end of each line of text. Enclosed in square brackets is information about color of label paper (other than white) or

printing (other than black), and form of the label (other than rectangular).

For other material (including paratypes), we report in full the locality data, date of collection and collectors. Label data about habitat, habits and seasonal occurrence are reported in summary fashion for each species.

Terms

Structural features. - Most of the terms used to designate details of structures are found in textbooks of general entomology, or are used by coleopterists, generally. Other words, used to designate particular structures or parts thereof, are not in general use, though they have been used by one of us in previous publications (Ball 1975, 1978; Allen and Ball 1980; Ball and Shpeley 2002). We provide information about these words here, as well as names that have been changed for certain structural features.

Microsculpture. A "sculpticell" is the space on the surface of the cuticle enclosed by adjacent microlines of the integumental system of microsculpture (Allen and Ball 1980:485-486). Microsculpture in subgenus *Pinacodera,* overall, varies from mesh pattern isodiametric with sculpticells convex, to transverse with sculpticells flat. Emphasis is placed on description of microsculpture of the sclerites of the dorsal surface, which is adequate for characterization of the species of the *latiuscula* species subgroup.

Chaetotaxy. This term refers to the fixed setae, which are the long, evidently tactile setae, commonly encountered on carabids: dorsal labral; clypeal; supraorbital; stipital; submental; mental; glossal; palpigeral; pronotal; elytral parascutellar, discal, and umbilicate (or lateral); coxal, trochanteral, femoral, and tarsomeral; abdominal sternal ambulatory (sterna IV, V, VI); and abdominal sternal terminal (sternum VII, near posterior margin).

Body parts. —The term "segment" is restricted to those body parts that reflect embryonic somites; thus, somite-like portions of the abdomen are referred to as segments. Abdominal segments are designated by Roman numerals corresponding to their respective somites. The first complete sternum is III, and the last one normally exposed is VII. For numbering the genital somites, we follow Bils (1976).

Portions of appendages are designated by the suffix "-mere", the prefix depending on the appendage in question: antenno-, palpo-, tarso-, etc.

Mandibles. Shpeley and Ball (2000:9-21, Figs. 6A-E) characterized the mandibles of the lebiine subtribe Pericalina, and illustrated the major features with SEM figures. We use here the same system.

Labium. The labium of *Pinacodera* in form is standard for Carabidae. For the combined glossae and paraglossae, we use the standard term ligula. The central sclerotized, apically setigerous structure is the glossal sclerite.

Pronotum. The pronotum is typical for *Cymindis*, (Figs. 3, 8A-8G and 9A-9I), covered by setae, moderately to more coarsely punctate, adjacent punctures not coalescing. Shape is somewhat various within and among species, from subquadrate (e.g. Fig. 8C) to more broadly expanded lateral margins (e.g. Fig. 8G).

Elytra. The elytra are typical in form for *Cymindis* with a single setigerous puncture at the base of stria 1, (Fig. 2C), many along or in the marginal striae with a single one near the apex (Figs. 2F, G, H). Form of the apex is various from being slightly produced (acute, Fig. 2F), more obtuse (Fig. 2H) to more evenly rounded (Fig. 2G). All intervals are setose from base to apex.

Male tarsal vestiture. One type of adhesive vestiture on the ventral surface of the fore and middle tarsomeres is exhibited by *Pinacodera* males: biseriate squamo-setae (for illustrations, see Shpeley and Ball 2000: 30, Figs. 12A-C).

Male genitalia. The surface of the phallus treated by convention as dorsal is really the ventral surface, and vice versa (Deuve 1993:88). We have chosen to remain with the conventional usage. Phalli were classified as: anopic, with the ostium dorso-medial; left pleuropic-anopic, with the ostium laterad, but more toward the dorsal surface; and left pleuropic, with ostium more toward the ventral surface.

Phalli, exhibiting interspecific differences in form (e.g., Figs. 10 and 11), are illustrated in left lateral aspect, with the bases toward the left of the page. These differences are seen readily as overall patterns ('Gestalt') but are not so easily described, except with notation of differences in size and shape of the distal area. To provide the basis for verbal description, two principal regions are distinguished, the shaft and basal lobe (Fig. 2B) or phallobase. The latter is the swollen area set at an angle to the ventrally curved shaft, surrounding the basal opening. Three areas of the shaft are recognized: a more distal periostial area subtending the ostial membrane, which surrounds the ostium, marking the place of egress of the endophallus during copulation; a more proximal middle area extended from the base of the ostium to the basal lobe; and a preapex (or preapical, or distal) area extended distally from the apex of the ostial membrane to the apex of the phallus.

Ovipositor. For naming the sclerites of the adephagan ovipositor, we follow the system used by Liebherr and Will (1998; see Figures 3-55), rather than persisting with the older system used by Shpeley and Ball (200:21). Comparing the systems, laterotergite = valvifer; gonocoxite 1 = stylomere 1; and gonocoxite 2 = stylomere 2. For the gonocoxites, the surfaces that are ventral in the retracted position are lateral when the ovipositor is extended; thus, such surfaces are designated as lateral, and the other surfaces are designated accordingly. Gonocoxite 2 is simplified, evidently by reduction (ensiform setae only two), (Liebherr and Will 1998).

Geographical terms. The term "Middle America" refers to México plus the republics of Central America, collectively. "Mesoamerica", for some authors, is the equivalent of Middle America. For anthropologists, it has a more restricted meaning, and for this reason, Mesoamerica is not used here.

Biogeographical parts of Middle America are recognized following Marshall and Liebherr (2000): Starting in the northwest; Arizona, Sonoran Desert, Sierra Madre Occidental-Central Plateau, Sierra Madre Oriental, Sierra Transvolcanica, Sierra Madre del Sur, Chiapan Guatemalan Highlands and Talamancan Cordillera in the southeast.

Biogeographical terms. The following terms are used: *Nuclear Middle America*, which includes northern Nicaragua, the Central American republics to the north thereof (Honduras, El Salvador, Guatemala and Belize), and México; and *Lower Central America,* which includes the southern part of Nicaragua, Costa Rica, and Panamá. Lower Central America is a region, which, until the Pliocene Epoch, consisted of a series of isolated volcanic

islands. Nuclear Middle America includes two parts: *Nuclear Central America*, northern Nicaragua north to the Isthmus of Tehuantepec; and México, north of that isthmus, for which we have no other designation.

Phylogenetic terms. In place of sister group or sister taxon, we use "adelphotaxon" (Ax 1987:36), for reasons given by that author. In place of "plesiomorphic" and "apomorphic", we use "plesiotypic" and "apotypic", on the basis that the latter pair have a more general connotation than the former pair (Tuomikoski 1967).

Genus *Cymindis* Latreille, 1805

Subgenus *Pinacodera* Schaum, 1857: 294. GENERITYPE: *Cymindis limbata* Dejean, 1831: 32 (designated by Lindroth, 1969: 1067). – LeConte 1861: 24.- Chaudoir, 1875: 2. – Horn, 1881: 156. – 1882: 146. – LeConte and Horn, 1883: 45. – Bates, 1883: 187-188. -1884: 296. – Blatchley, 1910: 142, 152. – Leng, 1920: 67. – Casey, 1920: 279. – Csiki, 1932: 1487. – Blackwelder, 1944, 62, - Jeannel, 1949: 878. – Ball, 1960: 161. –Lindroth, 1969: 1067-1070. – Erwin, Whitehead and Ball, 1977: 4, 58. – Ball, 1982: 517-518 – Ball and Hilchie, 1983: 139. – Bousquet and Larochelle, 1993: 268. – Ciegler, 2000: 119. – Ball and Bousquet, 2001: 111. – Lorenz, 2005: 465-466. – Hunting, 2013: 13.

The taxonomic content of this genus was proposed by Ball and Hilchie (1983: 129-157) to include four subgenera: the Afrotropical-Oriental *Afrotarus* Jeannel 1949; the Oriental-southern Palaearctic *Taridius* Chaudoir 1876; the Megagean *Cymindis* (*sensu stricto*); and the Western Hemisphere *Pinacodera* Schaum 1857. This arrangement, as reasonable as it seemed to us, was rejected by our European colleagues (Basilewsky 1984: 549; and Lorenz 2005: 465-469), who elected to rank these groups as genera, thereby maintaining an inflated generic concept within the subtribe Cymindidina and losing a taxonomic unity clearly indicated especially by the structural details of the ovipositor. Bousquet (2012) recognized two sub genera, *Tarulus* and *Pinacodera* (Table 1).[1]

Recognition. As noted above, the genus *Cymindis* is represented in the Western Hemisphere by two subgenera: *Cymindis* (*sensu stricto*) and *Pinacodera*. Their geographical ranges overlap extensively in the Nearctic Region. For geographical distribution, see maps in Hunting (2013, p 4-5, Figs. 1-2). Adults of the two subgenera are not easily distinguished from one another. In general, adults of *Pinacodera* are flatter, with ventral surface of the head and proepisternum glabrous, these surfaces impunctate (most individuals) or very sparsely punctate, elytron with apical margin clearly sinuate (Figs. 2F, 2G, 2H), and tarsal claws with long pectinations. In contrast, adults of *Cymindis* (*sensu stricto*) have the body surface more densely setose (including ventral surface of head and proepisternum). Males of *Pinacodera* have fore and middle tarsomeres 1-4 expanded, tarsomeres 1-3 ventrally with adhesive biseriate squamo-setae, whereas males of *Cymindis* (*sensu stricto*) have only fore tarsomeres 1-3 expanded, with adhesive setae ventrally.

In areas where the ranges of the two subgenera overlap, *Pinacodera* adults have the metepisterna elongate, and most (but not all) are macropterous, whereas adults of *Cymindis* (*s. str.)* are brachypterous and the metepisterna are approximately quadrate.

Adults of *Pinacodera* resemble superficially (in form and rufopiceous color of the body) those of some species of *Plochionus* Dejean, *Calleida* Latreille and Dejean, and *Infernophilus* Larson. These genera are calleidines: the adults have essentially glabrous body integument, and tarsomere 4 glabrous. Further, only the fore tarsomeres of males have adhesive setae ventrally.

Description. Form and size. Body flat, moderately elongate. Size in mid-range for carabids, SBL *ca.* 6.5-10 mm.

Color. Somber (rufous to black), with dorsal surface of most specimens darker than ventral surface and appendages paler than body integument. Head concolorous. Pronotum with lateral areas paler than disc, or uniformly concolorous. Elytral epipleura of most specimens paler than dorsal surface. Antennae rufotestaceous to rufopiceous, with antennomere 1 (scape) of most specimens paler than antennomeres 2-11. Legs rufotestaceous to black, with femora of most specimens paler than other articles.

Microsculpture and luster. Mesh pattern in general isodiametric or transverse but sculpticells comparatively wide. Body surface either dull or shining, but not iridescent. Labrum: mesh pattern isodiametric. Clypeus: mesh pattern isodiametric to transverse, or microlines partially or totally effaced, surface smooth. Head capsule dorsally with mesh pattern isodiametric, microlines distinct or indistinct, or microlines partially to completely effaced. Pronotum: mesh pattern uniformly transverse, or isodiametric posteriolaterally, or microlines partially or completely effaced, surface smooth. Scutellum: shiny, microlines shallow, mesh pattern, isodiametric to transverse or obscured. Elytra: mesh pattern uniformly isodiametric**.** Thorax, ventral surface: prosternum and pterothorax with mesh pattern transverse, microlines evident, or partially or completely effaced; proepisternum with mesh pattern oblique, microlines partially to completely effaced. Abdominal sterna with mesh pattern transverse, microlines evident or partially to completely effaced.

Macrosculpture. Surfaces generally smooth, but head capsule dorsolaterally (*i.e*. beside and in front of eyes) with two to four or five irregular ridges and grooves more or less

[1]Bousquet, in his remarkable Catalogue (2012: 1284), " for practical reason" also declined to accept the Ball-Hilchie proposal to re-rank the 14 supraspecific groups of Cymindis (senso stricto) (Lorenz 2005: 465-470) as species groups, but recognized Pinacodera as a subgenus of Cymindis (senso lato). Following Lindroth (1969: 1072-1073) Bousquet (2012) included the Nearctic species of Cymindis (except members of Pinacodera in the subgenus Tarulus (Bedel, 1906). We treat this assemblage as the C. zargoides species group of Cymindis (senso stricto). We draw attention here to the classification of the South American genus Leptosarcus Peringuey. As noted and evidently accepted as correct by Bousquet (2012: 1284) this genus was placed by Lorenz (2005: 470) in the cymindidina. Previously, Ball and Hilchie (1983: 119) and Basilewsky (1984: 538) had placed it in the thyreopterine Percalina. Superficially adults of this genus, in habitus and color, are cymindine-like (Ball and Hilchie 1983: 110, Fig. 26-28) but details of dorsal microsculpture, elytral setation, form of labrum and structure and setation of ovipositor gonocoxite 2 are characteristic of the Pericalina. We are satisfied that the latter placement is correct, with the cymindine features being either plesiotypic, or convergent.

distinctly developed. Frons and vertex smooth or variously punctate in most species; in specimens of some species, surface rugose, very coarsely, or densely punctate.

Chaetotaxy. Mostly standard for lebiine adults: clypeus, one pair; supraorbital setae, two pairs; mentum, one pair; pronotum two pairs lateral setae; elytra, each with two setae, in or near stria 3 (individually varying to one or three); umbilical series more or less continuous, about 20 setae; middle coxae each with lateral row of three to five setae; hind coxae each two setae; abdominal sterna III-VI each with one pair of ambulatory setae; sternum VII posteriorly with row of four to six setae in both sexes.

Punctures and cuticular setae ("hairs"). Head capsule various, with frons and vertex impunctate and glabrous to sparsely punctate and setose, setae long or short (Figs. 4-7). Antennomeres 1-3 either glabrous (except normal long preapical setae) or sparsely setose, setae short, antennomeres 4-11 dense, setose; pubescent. Pronotum glabrous and impunctate to moderately densely punctate, setae long or short. Prosternum punctate, with short setae; propleura and proepipleura glabrous, impunctate. Pterosterna punctate, with short setae; mesopleura impunctate, glabrous; metepisterna either impunctate, glabrous, or very sparsely punctate, with short setae. Legs: femora sparsely setose; tarsomeres dorsally either glabrous (except for single pair each of long, preapical setae), or sparsely setose. Tarsomere 5 with row of several long setae on each ventrolateral margin. Elytra with intervals impunctate and glabrous, or very sparsely punctate and glabrous, or setose, uniseriately punctate, or uniformly bi, or tri punctate, or biseriately punctate in basal half, uniseriately punctate or impunctate toward apex. Abdominal sterna II-VII with sparse vestiture of short setae, surface sparsely punctate.

Head. Form and proportions (Figs. 4, 5, 6) about standard for lebiine adults, eyes of most specimens markedly convex, but flattened in those of a few species; frontal impressions broad, shallow. Paragenae at minimum width much less than width of antennomere 2.

Antennae. Standard in form and length, for lebiine adults; antennomeres 4-11 filiform.

Mouthparts. Labrum standard in form and proportions. Mandibles (Ball and Hilchie, 1983: 140, Figs. 43A-D) trigonal, not explanate ventrolaterally, each with distinct scrobe on lateral surface; ventral surface glabrous, except row of rather short microtrichia in ventral groove; left mandible with long terebral area, occlusal surface with long terebral ridge, retinaculum edentate, retinacular ridge and molar areas short; right mandible dorsally with tumid area lateromedially on dorsal surface, occlusal surface with long terebral ridge, prominent retinacular area, small anterior retinacular tooth, and moderately well developed molar area. Maxillae (Ball and Hilchie 1983: 141, Fig. 45) with stipes and palpifer each with one lateral seta; Lacinia with patch of setae preapically; galea broad, galeomere 2 short, apical margin subtruncate; palpus with palpomere 4 subfusiform, apical margin truncate, though narrow. Labium (Ball and Hilchie 1983: 141, Fig. 46): mentum bisinuate anteriorly, with distinctly developed epilobes and tooth, latter either broad with truncate apex, or narrower with apex bluntly pointed; glossal sclerite with one pair of apical setae, paraglossae membranous, adnate along medial edge to glossal sclerite, apices extended beyond apex of latter; palpus sparsely setose, anterior margin of palpomere 2 with three or more setae.

Thorax. Pronotum (Figs. 3, 8, 9**)** (Lindroth 1969: 1068, Fig. 536) of most adults transverse to subquadrate, laterally explanate or not; lateral margins rounded, constricted evenly posteriorly, or sinuate; anterior margin slightly concave; posterior margin either subtruncate or slightly lobed medially; disc slightly convex, lateral margins more or less elevated; lateral bead indistinct in individuals of most species, moderately developed in few; posteriolateral angles right or slightly obtuse; median longitudinal and anterior transverse impressions fine, shallow. Proepipleura extended at about right angle from proepisternum if pronotum explanate, otherwise only slightly curved outward. Other propleural and prosternal sclerites standard, intercoxal process not margined apically.

Pterothorax. Metepisternum either longer than wide at base, or short, with lateral and anterior margins sub equal.

Elytra. Standard for adult lebiines, humeri broadly rounded, normally developed, or slightly constricted; apical margin subtruncate, more or less sinuate, apical angle at suture rounded (Fig. 2G**),** or more or less angulate, projected as small denticle (Figs. 2F and 2H**).** Surface flat; basal ridge complete, extended from humeral angle nearly to scutellum; striae shallow, finely punctate, either complete or broken into series of linear punctures; parascutellar stria joined or not to stria 1; intervals flat, or slightly but obviously convex. Elytral epipleuron standard for lebiines, not explanate.

Hind wings. Normally developed with narrow, elongate wedge and oblongum cells, or variously reduced.

Legs. Standard for lebiines; middle and hind tibiae canaliculate on dorsal (posterior) surface; fore tibia similarly canaliculate or not. Male with fore and middle tarsomeres 1-4 ventrally with biseriate squamo-setae. Tarsal claws pectinate.

Abdomen. Sterna II-VII standard for carabids; sternum VII with apical margin evenly rounded, of similar shape in both sexes.

Male genitalia. Phallus more or less tubular, anopic; more or less straight or curved, basal area with or without prominent projection on left side; apical portion either short or variously elongate, broad and flat or cylindrical; dorsally wither with or without ridge and denticle. Endophallus with or without apical C-shaped sclerite (as in males of *Cymindis* (*s. str.*)), preapical microtrichia patches, or medial spine patches. Parameres typical for lebiomorphs, both asetose; - left larger, conch-like, right smaller, violin-like.

Female genitalia and associated sclerites. (cf. Figs. 76A-C, in Ball and Hilchie 1983: 152). Segment VIII with tergum and sternum divided into two parts: each hemitergite with pronounced apodeme and associated ridge; each hemisternite with short broad apodeme and small fenestra. Tergum X transverse narrow. Ovipositor with transverse, narrow, asetose laterotergite; gonocoxites 1 and 2 present, gonocoxite 2 (Figs. 12 and 13) with base narrow, apex various, broadly rounded to acutely pointed, with two ensiform setae, one on ventral margin, and one on dorsal margin; preapical setose organ with nematiform setae short.

Immature stages. See Mahar (1978) for description of the larvae and pupae of *C. platicollis*. Otherwise, immatures are unknown.

Included taxa. This subgenus contains **32** species.

Habitat and Activity. Habitats include forests of

various types (tropical wet and dry, oak and pine [lowland to montane], and cloud forest) and scrubby desert vegetation. Many species appear to be arboreal, as indicated by adults collected from bromeliads and squirrel nests, and from under bark on standing tree trunks, while others seem to be geophile inhabitants of leaf litter. Some species seem to be both arboreal and geophile. Elevational range extends from sea level to 3060 m. Activity seems to be principally nocturnal, with many adults collected at night using liquid baits painted on tree trunks. Flight is also nocturnal, as indicated by catches of many specimens in light traps.

Geographical distribution. The range of subgenus *Pinacodera* extends through Middle America, from Panamá to northern México, southwestern USA, and in the east to southeastern Canada (Lindroth 1969: 1067-1069, Hunting 2013: 3, Fig. 2).

Table 1. Classification of the *Cymindis* subgenus *Pinacodera*

Family Carabidae; subfamily, Lebiinae; tribe Lebiini;
Genus *Cymindis*;
Subgenus *Pinacodera*
C. limbata group (revised by Hunting 2013)
C. limbata subgroup
C. complanata Dejean
C. limbata Dejean
C. rufostigma Hunting
C. platicollis platicollis (Say)
C. platicollis atripennis (Casey)
C. punctigera subgroup
C. punctigera punctigera LeConte
C. punctigera sulcipennis (Horn)
C. chevrolati subgroup
C. chevrolati Dejean
C. laevior (Bates)
C. ruficornis (Bates)
C. latiuscula group
C. latiuscula subgroup (this manuscript)
C. apache **new species**
C. crenatoverpa **new species**
C. cuyuteca **new species**
C. geminata **new species**
C. huichilobos **new species**
C. latiuscula (Chaudoir)
C. punctifera punctifera (LeConte)
C. punctifera toltec **new subspecies**
C. rugofrons **new species**
C. tonatiuh **new species**
C. yaqui **new species**
C. zacapa **new species**
C. zapotec **new species**
C. chalcea subgroup
C. chalcea
C. basipunctata subgroup
C. basipunctata
several undescribed species
C. tacanamera subgroup
C. tacanamera
many undescribed species

Key to Western Hemisphere subgenera of *Cymindis* Latreille and to the species groups and subgroups of subgenus *Pinacodera* Schaum, based on characters of adults (from Hunting 2013:14)

1. Middle and hind tarsomeres dorsally with six or more setae. Hind femur, anterior surface (ventral in pinned specimens) ventrad with row of three or more long setae. Male middle tarsi without biseriate adhesive setae ventrally; fore tarsomeres 1-3 with biseriate adhesive setae ventrally. subgenus ..... *Cymindis (s. str.)*
1' (2). Middle and hind tarsomeres dorsally with four or fewer setae. Hind femur, anterior surface ventrad, with two long setae. Male middle tarsomeres 1-3 with biseriate adhesive setae ventrally; fore tarsomeres 1-4 with biseriate adhesive setae ventrally ..... subgenus *Pinacodera* …… 2

2 (1'). Elytra densely, uniformly punctate and setose, concolorous, rufopiceous .... *Cymindis (Pinacodera) latiuscula* subgroup
2'. Elytra glabrous to densely setose, punctures sparse to dense, or not evenly distributed, color various, with or without metallic sheen 3

3 (2'). Elytra with shallow depression posteriad, extended from suture to interval 5. Brachypterous, metepisternum nearly quadrate .... *Cymindis (Pinacodera) tacanamera* subgroup
3'. Elytra in posterior one third plane, without shallow depression. Macropterous or brachypterous, with metepisternum distinctly longer than wide at base 4

4 (3'). Legs with femora and tibiae rufo-piceous to black .....*Cymindis (Pinacodera) limbata* group (in part) .... *C. chevrolati* complex
4'. Legs rufous to rufo-testaceous 5

5 (4'). Elytra metallic green, intervals rather densely and evenly punctate throughout .... *Cymindis (Pinacodera) chalcea* subgroup
5'. Elytra rufous to piceous in color, not metallic 6

6 (5'). Elytra basally with intervals moderately densely punctate, but apicad less dense, and impunctate on apical declivity ...*Cymindis (Pinacodera) basipunctata* subgroup
6'. Elytra with intervals moderately densely punctate to sparsely punctate, but apical declivity impunctate to punctate ..... *Cymindis (Pinacodera) limbata* group (in part)

***Cymindis latiuscula* species subgroup**

Recognition. Adults of the *C. latiuscula* subgroup exhibit moderately dense punctation evenly distributed over the pronotum (Fig. 3) and elytral intervals (Fig. 2C). The dorsal surface of the body is unicolorous, ranging from rufous (most species) to piceous, with ventral surface somewhat paler, and the appendages paler still, in most species testaceous, and non-metallic in luster. The head macrosculpture varies from relatively smooth with few setigerous punctures to markedly rugose and quite densely setose, especially along the lateral margins of the frons and vertex. All species are macropterous.

Description. The subgroup is uniform in general body form and size. Sculpture of the head and shape of

the pronotum are useful for recognition of some species. The greatest variation observed was in the structure of the phallus of the males. Variation was present in the form of the female gonocoxa, but not to the degree seen in male genitalia.

Immature stages. Unknown.

Geographical distribution. The range of the *latiuscula* species subgroup extends from Neotropical Costa Rica northward through Middle America to southwestern Nearctic USA. Center of diversity appears to be southern México north of the Isthmus of Tehuantepec, with a secondary center south of the Isthmus, and another in Arizona and northern México.

Key to the species of the *latiuscula* species subgroup, based on characters of adults

1. Abdominal sternum VII with four setae (Fig. 2D). Head with frons impunctate, finely punctured or with few scattered larger punctures (Figs. 4A-E, 5A-C, and 5E-F, 6A-G, 7A-C, and E-H) 2
1'. Abdominal sternum VII with six setae (Fig. 2E). Head with frons coarsely punctate, many punctures anastomosing in form of shallow grooves laterally (Figs. 5D, 7D). Pronotum (Fig. 9D), Phallus (Figs.11F, 11G). Gonocoxa (Fig. 13B) ..... *Cymindis rugofrons*, **new species**

2 (1). Elytron with apex at suture rounded, obtuse, (equal to or greater than 90°) (Figs. 2G, 2H) 3
2'. Elytron with apex angulate, produced, more acute (Fig. 2F). Phallus (Fig 11H). Gonocoxa (Fig. 13C). Head (Figs. 5E, 7E). Pronotum (Fig. 9E) .... *Cymindis tonatiuh,* **new species**

3. (2) Locality of collection, north of 23° north latitude and/or west of 103° west longitude (northern and western México, and southern U.S.A.), arid to semi arid habitat. Frons punctate or not 4
3'. Locality of collection, south of 23° north latitude (southern and eastern México, and north of Panama), tropical, subtropical, cloud and oak pine forests. Frons impunctate, finely punctured or with few scattered larger punctures 6

4 (3). Elytral apical margin more broadly rounded (Fig. 2G). Phallus shorter, 1.5 - 2.3 mm, preapex spatulate or rounded (Figs. 10A, 10B 11A, 11B) 5
4'. Apex of elytron close to 90° to slightly obtuse (Fig. 2H). Phallus long, 2.3 - 2.5 mm, preapex slightly flattened (Figs. 11I, 11J, 11K). Gonocoxa (Fig. 13D), Arizona, northern México. Head (Figs. 5F, 7F). Pronotum (Fig. 9F) ..... *Cymindis yaqui*, **new species**

5 (4). Smaller, SBL of males less than 7.4 mm, females less than 7.9 mm. Phallus short, 1.5 - 1.9 mm, with slightly rounded preapical portion (Figs. 11A, 11B). Gonocoxa (Fig. 12F). Northern and western México, and southwestern U.S.A. Head (Figs. 5A, 7A). Pronotum (Fig. 9A) . ... *Cymindis punctifera punctifera*, (LeConte), **new rank**

5'. Size larger, SBL of males more than 7.6 mm; of females more than 8.1 mm. Phallus long, 2.0 – 2.3 mm, apex broadly spatulate (Figs. 10A, 10B). Gonocoxa (Fig 12A). Northern México and Arizona. Head (Figs. 4A, 6A). Pronotum (Fig. 8A) ..... *Cymindis apache,* **new species**

6 (3'). Head with frons impunctate, or with fine asetose punctures, vertex with few shallow punctures (Figs. 4D, 5B, 5C, 7F, 7G) 7
6'. Head with frons with punctures setose, vertex with punctures more numerous and deeper (Figs. 4B-D, 4F), pronotum (Figs. 8B-D) usually less transverse, PL/PW ratio less than 0.67 10

7 (6). Head with frontoclypeal suture more or less straight, frons with few scattered punctures. Phallus with preapex rounded, not hooked ventrad. México 8
7'. Head, frontoclypeal suture arcuate, frons with very fine punctures bordered halfway to the eyes with a shallow transverse sulcus. Head macrosculpture (Fig. 7G) irregular shallow impressions. Phallus preapex sharply hooked ventrad (Figs. 11L, 11M), endophallus with microtrtichial patches. Gonocoxa 2, shaft sub-parallel (Fig. 13E). Pronotum broad, PL/PW ratio 0.63-0.66, (Fig. 9G). Costa Rica, Guatemala, Honduras . *Cymindis zacapa*, **new species**

8 (7).Head shiny, more or less devoid of microlines, more elongate in appearance, few setose punctures on vertex (Figs. 7H, 7I), pronotum less transverse, PL/PW ratios 0.70-0.74 (Fig. 9H, 9I). Gonocoxa 2, apex sickle-like (Fig. 13F) ..... *Cymindis zapotec,* **new species**
8'. Head dull, microsculpture mesh pattern isodiametric, wider in appearance (Figs. 7B, 7C), pronotum more transverse PL/PW ratios 0.63 – 0.72 (Figs. 8F, 8G, 9B) 9

9 (8') Phallus more markedly curved (displacement 0.78, 0.75 – 0.80 mm), apex with a distinctive bend (Figs. 10L, 10M). Gonocoxa 2, not sharply curved (Fig. 12E). Head (Figs. 6F, 6G). Pronotum (Figs. 8F, 8G). Tropical lowland (to 1400 m, mean 616 m), Yucatan Peninsula .... *Cymindis latiuscula* (Chaudoir), in part
9'. Phallus straighter (displacement 0.65, 0.54 – 0.74 mm), preapex with a less pronounced bend (Figs. 11C-E). Gonocoxa 2, stout, not sharply curved (Fig. 13A). Head (Figs. 5B, 7B, 7C). Pronotum (Fig. 9B, 9C). México, widespread, to 2560 m .... *Cymindis punctifera toltec* **new subspecies**

10 (6'). Males, phallus longer than 1.9 mm, SBL more than 8.5 mm. Females larger, SBL more than 9 mm..... 11
10'. Males, phallus shorter than 1.9 mm. SBL less than 8.1 mm. Female SBL less than 8.25 mm. Gonocoxa 2, apex sickle like (Figs. 12B, 12C) 12

11 (10). Male, phallus preapex straight, short, less than 0.20 mm, overall form strongly arched (Fig. 10G), Head (Fig. 6C). Pronotum (Fig. 8C) (uplands, cloud forest) (female not known) ..... *Cymindis cuyuteca* **new species**
11'Males, phallus with preapical portion hooked down, longer than 0.20 mm (Fig. 10K). Gonocoxa 2, parallel sided, apex spatulate (Fig. 12D). Head (Figs. 6E). Pronotum (Fig 8E). Pacific Coastal lowland, Oaxaca ....*Cymindis huichilobos*, **new species**

12 (10'). Phallus with lateral notch preapically (Figs. 10C, 10F). SBL of male greater than 7.5 mm. Gonocoxa (Fig. 12B). Head (Figs. 4B, 6B). Pronotum (Fig. 8B) .... *Cymindis crenatoverpa*, **new species**
12'. Phallus without notch, preapical portion slightly flattened (Fig. 10H), SBL of male less than 6.8 mm, of female less than 7.4 mm. Gonocoxa (Fig. 12C). Head (Figs. 4C, 6D). Pronotum (Fig. 8D). Body shorter, SBL less than 7.8 mm ..... *Cymindis geminata*, **new species**

Cymindis (*Pinacodera*) *apache*, Hilchie & Ball, new species

(Figs. 2G, 4A, 6A, 8A, 10A, 10B, 12A, 14, 29, 31
http://zoobank.org/A78D8A96-AC91-463C-8BF5-3A0DC6094E4

Type material. HOLOTYPE: Male: U.S.A., Arizona "// Ramsey Canyon / Huachuca / Mts. / Ariz. W H Mann // W M Mann 1954 / collection // (USNM)

PARATYPES, 461**: MÉXICO. Chihuahua:** 19.9 km N, Ejido Zaragoza, 2310 m, oak-pine for. (damp), 79-82, 24.VII.1979, J.S. Ashe, G.E. Ball, D. Shpeley, 1F (UASM); 13.3 km E, El Vergel, oak-pine, arroyo, litter, 2650 m, 83-26, 12.VII.1983, H.E. Frania, R. Jaagumagi, D. Shpeley, 1M (UASM); 48.1 km N, Madera, 2030 m, oak-pine arryo litter, 83-25, 9.VII.1983, H.E. Frania, R.J. Jaagumagi, D. Shpeley, 1F (UASM); 48.1 km N, Madera, 2480 m, oak-pine forest litter, 83-26, 9.VII.1983, H.E. Frania, R.J. Jaagumagi, D. Shpeley, 2M, 1F (UASM); 28.3 km E, Mesa de Tres Rios, Sonora, 2160 m, oak-pine forest, arroyo, 83-19, 7.VII.1983, H.E. Frania, R. Jaagumagi, D. Shpeley, 1M (UASM); Rio Negro, 48.8 km E, Mesa de Tres Rios, Sonora, 1790 m, UV light, 83-24, 8.VII.1983, H.E. Frania, R. Jaagumagi, D. Shpeley, 1F (UASM); 9.7 km S, Yecora (Sonora), 1750 m, 2-3.VII.1990, S. McCleve, 2F (UAIC). **Sonora:** El Aserradero, 24.0 km (by air) WSW Fronteros, Sierra Bunenos Aires, Ajos-Bavispe Res., 30.77694°N, 109.8136°W, rocky mountainside, oak woodland with pines, 1702 m, 14.VIII.2016, T.R. Van Devender, J.D. Palting, 1F (UASM); 2 km N, Mesa de Tres Rios, 1950 m, oak-pine forest, UV light, 83-17, 6.VII.1983, H.E. Frania, R. Jaagumagi, D. Shpeley, 1M, 1F (UASM); 4.5 km N, Mesa de Tres Rios, 1950 m, UV light, 5.VII.1983, 83-11, H.E. Frania, R. Jaagumagi, D. Shpeley colls., 2F (UASM); 4.5 km N, Mesa de Tres Rios, 1950 m, oak-pine forest, 6.VII.1983, 83-12, H.E. Frania, R. Jaagumagi, D. Shpeley colls., 2F (UASM); Mina Puertecitos, ca. 9.5 km (by air) WNW Cananea, Sierra Elenita, 30.11278°N, 110.39°W, Rocky ridge top, pine oak forest 1942 m 30.IV.2016, T.R.Van Denvender, J.D. Palting, 1M, 1F (UASM); Mt. Huachinera, Rancho Madroño, 2200 m, at light, 25.V.1981, S. McCleve, 3M (UAIC); Sierra Huachinera, 22.1 km SE, Huachinera, 2090 m, oak-pine forest, 82-05, 3-4.VIII.1982, G.E. & K.E. Ball, S. McCleve, 2F (UASM); Rancho el Tigre, N of Mina el Tigre, Sierra el Tigre, camp, 30.58944°N, 109.20722°W, 28.3 km (by air) WNW Bavispe, pine-oak forest, 2297 m, 10.VIII.2015, T.R. Van Devender, A.L. Reina-G., J.D. Palting, 1M, 1F (UASM); Rancho el Tigre, just N of Mina el Tigre, Sierra el Tigre, 30.57667°N, 109.2683°W, 29.0 km (by air) WNW Bavispe, pine-oak forest, 2297 m, 25.VI.2015, T.R. Van Devender, A.L. Reina-G., 2M, 5F (UASM); Sierra Buenos Aires, 30.72668°N, 109.82116°W, rocky mountainside oak woodland with pine, Hg vapor light, 1707 m, 16.VIII.2016, D. Shpeley 01-16, 1M (UASM); Sierra Huachinera, 32-34 km NE, Nacori Chico, 1950 m, oak-pine forest, 82-10, 6-7. VIII.1982, G.E. & K.E. Ball, S. McCleve, 1M, 1F (UASM); Sierra Huachinera, Arroyo NE, Cocono, 86.2 km NE, Nacori Chico, 1660 m, riparian forest, 82-11, 7-8.VIII.1982, G.E. & K.E. Ball, S. McCleve 1M (UASM); Sierra Juriquipo, Rancho La Zulema, 15.9 km (by air) SE Nacozanide García, 30.28389°N, 109.56028°W, rocky mountainside, oak woodland, 1687 m, 15.VIII.2017, T.R. Van Devender, J.D. Palting, 1F (UASM); Sierra El Tigre, 30.58988°N, 109.20811°W, Camp large flat area, pine oak forest, at night head lamping on ground, 2261 m, 12. VIII.2015, 11-15, 2M, 2F (UASM); Yecora, 20-22.V.1961, Gibson, Howden, Martin 1M (CNCI); 6.4 km NE, Yecora, rd. to Maycoba, 1547 m, UV, 30.VI-1.VII.1990, S. McCleve, 1M, 1F (UASM); 11.6 km NW, Yecora, 1646 m, 7-11.VIII.1990, P. & E. Jump, 2M (UASM); 11.6 km NW, Yecora, 1646 m, UV, 28-29.VI.1990, S. McCleve, 1M, 2F (UASM). **U.S.A. Arizona:** *Cochise County*: Bisbee, 19.VIII.1967, R.F. Sternitzky 1M, (CNCI); Charleston, 1340 m, 16.V.1968, R.F. Sternitzky, 1F (CNCI); *Chiricahua Mountains,* 1830 m, 29,VI.1968, [K.P. Stephan] 1M (TAMU); *Chiricahua Mountains,* Cave Creek Canyon, 1530 m, 4.VIII.1986, W.T. Lanier, 1M (MTEC), Cave Creek Canyon, UV, 5.VIII.1986, D.R. Corr, 1M (MTEC), Cave Creek Canyon, 20.VII.1968, D.E. Bright, 1F (CNCI), Cave Creek Canyon, 4 km W, Portal, 1590 m, UV, 21-22. VIII.1981, J.K. Liebherr, 1F (CUIC), Cave Creek Canyon, near Portal, UV light, 1570 m, 5.VIII.2003, E.G. Riley, 1F (TAMU); *Chiricahua Mountains,* Cave Creek Canyon, South Fork, UV, J. Stibick, (USNM) - (evening, Lot No. 135, 9.VII.1964, 1M; 8-9 PM, Lot No. 136, 10.VII. 1964, 1M, 1F; 1620 m, Lot No. 140, 11.VII.1964, 1M; 8-9:30 pm, Lot No. 163, 18.VII.1964, 1M); *Chiricahua Mountains,* Cave Creek, South Fork, UV, 6.VIII.1986, B.J. Johnson, 2F (MTEC); *Chiricahua Mountains,* [Cave Creek], South Fork Canyon, Lot. No. 824, 13.VII.1964, R.H. Arnett, Jr., E.R. Van Tassel, 2M (FSCA); *Chiricahua Mountains*, Fly's Peak, 2900 m, 9.VII.1927, J.A. Kusche, Van Dyke Collection, 3M (CASC); *Chiricahua Mountains*, Herb Martyr Camp, 10 km. SW Portal, 1700 m, riparian forest, ex f.i.t., S&JP 2000-17, 9.V.2000, S. & J. Peck 2M, 4F (CMNC); same, except S&JP 2000-24, 20.V-5.VI.2000, 2M, 2F (CMNC); *Chiricahua Mountains*, Onion Saddle Road at East Turkey Creek, 1960 m, pine-oak forest, UV, 6.VII.1966, R.C. Beard, 2F (CUIC); Onion Saddle, 2320 m, pine-oak forest, UV, 7.VII.1966, R.C. Beard, 1M, (CUIC); *Chiricahua Mountains,* Portal, 24.VI.1967, J.W. Tilden, 1F (USNM), Portal, 22.VI.1966, D. Larson, W. Sharp, 1F (UASM), Portal, 26.VII.1965, W. Rosenberg, 1F (USNM); nr. Portal, at light, 16.VI.1973, S. McCleve, 1M (UASM), nr. Portal, 28.VII-7.VIII.1968, 1F (TAMU); *Chiricahua Mountains,* Rucker Canyon, 21.VII.1968, D.E. Bright, 1F (CNCI), Rucker Canyon, 1730 m, Loc. 29, 22.VII. 1976, G.E. Ball, J.M. Campbell, P.M. Hammond, 1F (UASM); *Chiricahua Mountains,* Southwestern Research Station, near Portal, R. Rosenberg (USNM), — (9.VII.1964, 1M; 10.VIII.1973, 1M; 23.VIII.1973, 1M; 24.VII.1977, 1F; 27.VIII.1973, 1F; 16.VIII.1977, 1F; 18.VIII.1977, 1F; 22. VII.1977, 1F; 24.VIII.1977, 1M, 1F; 3.IX.1977, 1F; 4. IX.1977, 1F); near Southwestern Research Station, near Portal, 1675 m, 4.VIII.2003, E. Riley, 2F (TAMU);

Southwestern Research Station, Lot No. 289, 14-22. VII.1957, R.H. Arnett, Jr., 1F (FSCA); *Chiricahua Mountains,* Stewart Camp, 1.6 km S, Portal, UV, 18-20. VII1.1971, J.T. Doyen, 1F (EMEC); *Chiricahua Mountains,* Southwestern Research Station, 8 km SW Portal, at lights, 1645 m, 16-22.VIII.2000, M.J. Yoder, 1M (TAMU); *Chiricahua Mountains,* East Turkey Creek, 1960 m, pine-oak forest, UV, 10.VII.1966, R.G. Beard, 2M, 1F (CUIC); East Turkey Creek, 29.VIII.1967, R.G. Beard, 1F (CUIC); *Dragoon Mountains*, Cochise Stronghold, 22.VII.1985, P.K. Lago, 1M, 2F (PKLC); Cochise Stronghold, 1410 m, 6.X.1965, L. & C.W. O'Brien, blacklight trap, 1M, 1F (USNM); Cochise Stronghold, 12.VII.1978, G.J. Hilchie, 2M, 1F (GJHC); *Huachuca Mountains,* Ash Canyon, 20.VIII. 1968, R.F. Sternitzky, 1M (CNCI), Ash Canyon, 24.VII.1968, D.E. Bright, 1M (CNCI); *Huachuca Mountains*: Cave Canyon, 11.VI.1968, Flint, Menke, 1M (USNM); *Huachuca Mountains*: E, slope, pine-oak forest, 1760 m, Loc. 26, 20.VII.1976, J. M. Campbell, G. E. Ball, P.M. Hammond, 3M, 3F (UASM); "Huachuca Mts.", Acc. No. 5409, Coll. Chas. Palm, 1F (AMNH); Miller Canyon: 1530 m, 1.VII.1969, R.F. Sternitzky, 1M (CNCI); 1770 m, 11.VII.1974, E.E. Hoebeke, 6F (CUIC); 1.VII.1907, H.A. Kaeber, 1M (USNM); 4.VII.1974, T.L. McCabe, 1F (CUIC); 8.VII.1974, T.L. McCabe, 2F, (CUIC); 22. VII.1974, T.L. McCabe, 1F (CUIC); 1680 m, 21.VII.1985, A.E. Zuccaro, Jr., 1F (PKLC); Ramsey Canyon, 24 km S, Sierra Vista, 1830 m, R.F. Sternitzky (CNCI) — (15. III.1964, 1M; 15.IV.1964, 1F; 19.VI.1964, 1M; 14. VII.1964, 1F; 20.VIII.1964, 1M; 23.X.1966, 1F; 13.V.1967, 2M, 2F; 17.VI.1967, 1M, 1F; 29.VI.1967, 1M, 11.VII.1967, 1F; 16.VII.1967, 2M, 3F; 18.VII.1967, 1M, 2F; 20. VII.1967, 1M; 22.VII.1967, 2M, 1F; 7.IV.1968, 2M [endophallus w/ spermatophore], 6F; 18.IV.1968, 1F; 29. IV.1968, 2M; IV-V.1968, 3M, 1F; 22.V.1968, 1F; 29.V.1968, 1F; VI.1968, 1M, 4F; VII.1968, 10 M, 3F; VIII.1968, 4M, 15F; 11.VIII.1968, 3M, 2F; IX.1968, 3M, 10F; 3.IX.1968, 1M, 2F; 21.X.1968, 1M; 9.VII.1969, 2M); Sierra Vista, R. F. Sternitzky (CNCI) — (7.III.1964, 2M, 2F; V.1965, 1F; 1-20.X.1965, 2M; "1966", 1M; 14.VI.1967, 1M; 16. VI.1967, 6M, 5F; 20.VI.1967, 3M, 1F; 24.VI.1967, 5F; 25.VI.1967, 2F; 8.VII.1967, 1M, 1F; 20-31.VII.1967, 2M, 1F; 25.VII.1967, 2M, 13F; IX.1967, 6M, 4F; X.1967, 12M, 4F); Fort Huachuca, Blacktail Canyon Road, UV light, 2172 m, 12-14.IX.1995, Cate, Quinn, 1F (TAMU). *Graham County*: *Pinaleño Mountains*, Wet Canyon, 15.2 km W, Hwy 666 on Hwy 366, 23.VII.1985, A.E. Zuccaro, Jr., 3M, 3F (PKLC); [*Pinaleño Mountains*], Mt. Graham, Wet Canyon, 15 km SW Safford, 1800 m, ex f.i.t., S&JP 2000-11, 6.V-6.VI.2000, S. & J. Peck, 1F (CMNC). *Pima County*: Green Valley, VI.1973, Lenczy, 1M, 1F (OSUC); *Santa Catalina Mountains*, Bear Canyon, K.P. Stephan (TAMU) — (6.VII.1968, 1F; 25.VII.1969, 1M, 1F; 22.VI.1970, 1M; 30.VII.1970, 1M, 1F); Madera Canyon, 13.VI.1965, R.W. Poole, 2F (CUIC). *Santa Cruz County*: *Pajarito Mountains*, Peña Blanca Lake, 20.VII.1985, P.K. Lago, 2F (PKLC); *Santa Rita Mountains,* Madera Canyon, 7-30.VIII.1947, 1M (EMEC); Madera Canyon, 1900 m, 1-2.VIII.1952, H.B. Leech, J.W. Green, 1M (CASC); Madera Canyon, 16.VII.1956, A.E. Lewis, 1M (UCRC); Madera Canyon, J.G. Franclemont, (CUIC) — (30.VI.1959, 3F; 1.VII.1959, 1F; 2.VII.1959, 1F; 4.VII.1959, 2F; 20.VII.1959, 1F); Madera Canyon, [UV light], 3.VIII.1960, 1530-1770 m, G.E. Ball family, and R.B. Madge, 2F (UASM); Madera Canyon, J.D. Marshall, (CUIC) — (1490 m, 5.VI.1963, 1F; 1490 m, 10.VI.1963, 3F; 1710 m, 10.VI.1963, 2M, 3F; 11.VI.1963, 2M [1 w/ spermatophore in endophallus] 5F; 1490 m, 12.VI.1963, 1M, 1F; 1490 m, 1710 m, 14.VI.1963, 3M, 3F; 1710 m, 15.VI.1963, 1M, 1F; 1490 m, 16.VI.1963, 1F; 1490 m, 17.VI.1963, 1M; 1710 m, 17.VI.1963, 3M, 11F; 1490 m, 18.VI.1963, 2M, 1F; 1710 m, 18.VI.1963, 6M, 5F; 1490 m, 19.VI.1963, 1M; 1710 m, 20.VI.1963, 3M, 2F; 1490 m, 21.VI.1963, 1F; 1710 m, 21.VI.1963, 3F; 1490 m, 23.VI.1963, 1F; 1490 m, 25.VI.1963, 1M; 1710 m, 25.VI.1963, 3M, 1F; 1490 m, 26.VI.1963, 1M, 1F; 1830 m, 26.VI.1963, 4M; 1490 m, 27.VI.1963, 1F; 1710 m, 27. VI.1963, 3M; 1710 m, 28.VI.1963, 2M, 6F; 1490 m, 29. VI.1963, 1M; 1710 m, 29.VI.1963, 4M [1 w/ spermatophore in endophallus], 4F; 1710 m, 1.VII.1963, 1M, 2F); Madera Canyon, 12.VII.1066, W.H. Tyson, 1M (USNM); Madera Canyon, 1400-1670 m, 13-22.VI.2011, J. Wappes, B. King, 3F (UASM); Madera Canyon, Bog Spring Camp Ground, UV, 1560 m, 10-26.VII.1964, D. Davis, 1F (USNM); upper end Madera Cn. road, at picnic ground, 1680 m, 7.VIII.1967, R.G. Beard, 1M, 2F (USNM); 29.VII.68, D.E. Bright, 1F (CNCI); 8.VII.1970, K. Stephan, 2F (UAIC); 26.VII.1970, K. Stephan, 1M (UAIC); 2.VII.1977, W. Rosenberg, 2F (USNM); 3.VII.1977, W. Rosenberg, 1F (USNM); 13.VIII.1977, W. Rosenberg, 2F (USNM); 24.VII.1985, P.K. Lago 1F (PKLC); 4.VIII.1988, 1650 m, at light, M.A. Ivie, 1M (MTEC); 19 km S, Sonoita, Hidden Springs Canyon, 2.VI.1967, R.F. Sternitzky, 1M, 1F (CNCI).

Specific epithet. An aboriginal word, "Apache" is used as a Latinized nominative singular noun in apposition. It is based on the name of the aboriginal Apache nation on whose ancestral lands this beetle species lives.

Type locality. Ramsey Canyon, Huachuca Mountains, Cochise County, Arizona, U.S.A.

Recognition. Adults of *C. apache* are likely to be confused with those of *C. punctifera punctifera* and *C. yaqui*, the three taxa whose geographical ranges overlap extensively in southwestern U.S.A. and adjacent northwestern México. All three are similar in body form, integumental macrosculpture, and color (dorsal surface of body rufotestaceous to rufous). *Cymindis apache* is larger than *C. p. punctifera* (Table 2, no overlap in SBL between samples of the two species), and on average *C. apache* is larger than *C. yaqui*. Both *C. apache* and *C. p. punctifera* differ from *C. yaqui* in form of the elytral posterior (apical) sutural angle (round in *C. apache* (Fig. 2G) and *C. p. punctifera*, angulate in *C. yaqui* (Fig. 2H). In phallic details, males of these three taxa differ markedly: in form of apex (broadly spatulate in *C. apache*, (Fig. 10B) narrower and knobbed in *C. p. punctifera* (Fig. 11B), and narrow and more or less pointed in *C. yaqui* (Figs. 11K, 11L); and in curvature of the shaft (displacement, Table 6).

Description. Size, form, microsculpture and color average as per *C. p. punctifera*. Data on variation in SBL, phallic measurements, and in the ratio PL/PW are presented in Tables 2 to 7.

Punctation and vestiture. Head (Figs. 4A, 6A) vertex, irregular punctures; frons with few punctures, anterolateral sculpture not expanded.

Thorax. Pronotum in form average for *latiuscula* subgroup (Fig. 8A).

Elytra. Sutural apical angle rounded (Fig. 2G).

Male genitalia (Figs. 10A, 10B). Phallus (10A) relatively long (Table 4), broad (Table 5), markedly curved (Table 6), preapex (Fig. 10B) relatively long (Table 7), flattened, dorsoventrally, spatulate. Endophallus without dense patches of microtrichia.

Female genitalia (Fig. 12A). Ovipositor with gonocoxite 1 average for the subgroup, gonocoxite 2, parallel sided from base to insertion of ensiform setae, apical portion stout, bluntly pointed.

Habitat, habits and seasonal occurrence. This species is a resident of oak-pine montane forest. Elevational range (Fig. 31) extends from 1340 to 2900 m. Adults have been collected in every month of the year (Fig. 29) with the largest number of captures made during the months of summer. Many specimens were collected at UV light traps.

Geographical distribution. (Fig. 14). The range of this species extends in the Sierra Madre Occidental from western Sonora and Chihuahua northward to the slopes of the isolated mountain ranges (Chiricahua, Huachuca, Pajarito, Pinaleño, Santa Catalina, Santa Rita, etc.) in southeastern Arizona.

Geographical affinities. The range of *C. apache* is contained within the ranges of *C. p. punctifera* and *C. yaqui* (Fig. 14; cf. Figs. 20 and 26).

Morphological affinities. At present, the best candidate for an adelphotaxon is *C. yaqui* based on the elongate phallic preapex and its dorsoventral flattening (Fig. 10B; cf. Fig. 11K).

Material examined. We have examined 481 specimens of *C. apache*. For details, see type material, above.

Cymindis (Pinacodera) crenatoverpa, Hilchie & Ball, new species.

(Figs. 4B, 6B, 8B, 10C-F, 12B, 15, 29, 31)
http://zoobank.org/D54D9763-567B-4917-BEA4-B0CA1A9D8F1E

Type material. HOLOTYPE: Male: "// MEXICO Nay. Volcán / Ceboruco, 13 km w / Jala, oak for. few / pine; 1930-1970 m. / 24.VII.1983 83-55 // MEXICO EXPED. 1983 / H.E. Frania / R.J. Jaagumagi & / D. Shpeley colls. //" (USNM).

PARATYPES, 12: **MÉXICO. Guerrero:** 138.1 km NE, Atoyac de Álvarez, oak-alder, UV light, 1737 m, 18.VIII.1986, G.E. Ball, H.E. Frania, D.S Mulyk, 1M (UASM). **Jalisco:** 10.6 km NW Cuautla, arroyo, pine oak, 1710 m, 2.VIII.1985, H.E. Frania, D. Shpeley, 1M (UASM); nr El Rincón, 54 km NW, Los Volcanes, 1650 m, 11-12.VIII.1967, G.E. Ball, T.L. Erwin, R.E. Leech, 1M (UASM). **México** (State)**:** Real de Arriba, Temescaltepec, H.E. Hinton 1F (MCZC); Rincon, Temescaltepec, Hinton, 1M (MCZC); Tejupilco, Temescaltepec, H.E. Hinton, 1M (MCZC). **Michoacán:** 87.1 km W Apatzingán on road to Dos Aguas, scrub, UV light, 1220 m, 9.VIII.1985, H.E. Frania, D. Shpeley, 1M (UASM). **Nayarit:** km 33, El Cuarenteño, El Cora, 17.X.1989, A. Cadena, 2M (CNIN); Volcan Ceboruco, 8-12 km W, Jala, 4.X.1990, R. Turnbow, 1F (RHTC); Volcan Ceboruco, 13 km W, Jala, 1930-1970 m, oak forest, few pine, 24.VII.1983, H.E. Frania, R.J. Jaagumagi, D. Shpeley, 2M (UASM).

Specific Epithet. A compound noun in apposition, based on the Latin adjective *crenatus* for notched, and noun *verpa* for penis (or phallus), which refers to the notch near the apex of the phallus.

Type locality. Volcan Ceboruco, 13 km west of Jala, Nayarit, México.

Recognition. Slight expansion of the anterolateral macrosculpture, coarse punctation on the frons and relatively long frontal and pronotal setae are diagnostic for this species. The anterolateral margin of the frons is not markedly expanded as in specimens of *C. rugofrons*. Shape of the apical portion of the phallus (Figs. 10C, 10F) serves to distinguish males of *C. crenatoverpa* from all other males in the *latiuscula* species subgroup. Two females have been associated with the males.

Description. Size and form about average for *latiuscula* species subgroup. Data on variation of SBL, phallus and in the ratios PL/PW are presented in Tables 2 to 7.

Punctation and vestiture. Head (Fig. 4B, 6B), vertex with three to four rows of coarse punctures, coarse puncture fields laterally, anteriolateral sculpture slightly expanded, merged with puncture fields; central frons with many coarse setose punctures, setae longer than average for *latiuscula* species subgroup.

Thorax. Pronotum average to slightly narrower, coarsely punctate, setae longer than average for *latiuscula* species subgroup.

Elytra. Average in form for *latiuscula* subgroup.

Male genitalia (Figs. 10C-10F). Phallus (Figs. 10C, 10F) relatively short (Table 4), relatively broad (Table 5), curvature slight, ventral surface relatively flat (Table 6), with prepaex relatively short and broad (Table 7); preapex with a distinct notch in the lateral margin; right and left parameres respectively, as in Figs. 10D and 10E). Endophallus unarmed, without dense patches of microtrichia.

Female genitalia (Fig. 12B). Ovipositor with gonocoxite 1 average for the species subgroup, gonocoxite 2 tapered from base to apex, base much wider than width at insertion points of the ensiform setae, apex acutely pointed, scythe-like in form.

Habitat, habits and seasonal occurrence. Specimens were collected at elevations between 1220 and 1970 m during July, August, and October. One collection was in an oak forest, another at the edge of a cornfield, but in an area in which pine forest seemed to be the dominant form of vegetation. The natural plant association for the area is wet pine forest.

Geographical variation. Two population groups are apparent, one western and the other more central (Fig. 15). Differences in size are noted with western specimens being slightly smaller. The phallus shows a similar pattern in dimension (cf. Fig 10C, western male, and Fig. 10F, a central population male). These differences could reflect a species/ subspecies difference or simply be a collecting artifact from small samples. We choose to treat them as a single species in spite the disjunction in range (Fig 15). Similar habitat that this species probably occupies extends around the margin of the Sierra Transvolcanica.

Geographical distribution. (Fig. 15). The known range of *C. crenatoverpa* extends in the Transvolcanic Sierra from the area around Temascaltepec, México state, westward to Volcán Ceboruco, Nayarit, and southward to the lower slopes of the Sierra Madre del Sur, in the state of Guerrero.

Morphological affinities. The similarity of the structure

of the female gonocoxite 2 of *C. crenatoverpa* in overall appearance with *C. geminata* (Fig. 12C) and *C. zacpotec* (Fig. 13F) implies these species may be related. All three of these species occur in south central México in the Sierra Madre del Sur.

Geographical affinities. The geographical range of *C. crenatoverpa* (Fig. 15) is overlapped by the ranges of *C. latiuscula* (Fig. 19) and *C. p. toltec* (Fig. 20), and possibly by the ranges of *C. cuyuteca* (Fig. 16), *C. geminata* (Fig. 17), *C. rugofrons* (Fig. 24), and *C. tonatiuh* (Fig. 25).

Material examined. We have seen 13 specimens of this species. For details, see type material, above.

Cymindis (*Pinacodera*) *cuyuteca,* Hilchie & Ball, new species

(Figs. 6C, 8C, 10G, 16, 29, 31)
http://zoobank.org/069BF488-22A3-4BB2-B37F-77A65C62F1E3

Type material. HOLOTYPE: Male: "// MEX**.** Jal. 42.4 km / NW Cuautla, litter / pine-oak; 1760 m / 3.VIII.1985 28-85 // MEXICO EXP. 1985 / H.E. Frania & / D. Shpeley / collectors //" (USNM).

Specific epithet. An Aztec word, treated as a Latin singular noun in apposition, this species is named in honor of the Cuyuteca, an indigenous people of the Nahua (Uto-Aztecan) tribe, on whose ancestral lands this beetle species was discovered (southwestern Jalisco). The culture of the Cuyuteca is extinct, but the descendants are extant.

Type locality. 42.4 km northwest of Cautila, Jalisco, México.

Recognition. Externally similar to *C. crenatoverpa*, but differs significantly in being larger (Table 2) and the phallus longer (Table 4) and different in form (Fig. 10G).

Description. Size larger than average, and form about average for *latiuscula* species subgroup. Data on SBL, male phallus and in the ratios PL/PW are presented in Tables 2 to 7.

Punctation and vestiture. Head (Fig. 6C), vertex with three to four rows of coarse punctures, coarse puncture fields laterally, anteriolateral sculpture slightly expanded, merged with puncture fields; central frons nearly devoid of punctures, setae longer than average for *latiuscula* species subgroup.

Thorax. Average to slightly narrower for *latiuscula* species subgroup, coarsely punctate, setae longer than average for *latiuscula* species subgroup (Fig. 8C).

Elytra. Average for *latiuscula* species subgroup.

Male genitalia. Phallus (Fig. 10G) slightly longer (Table 4) and moderately broader (Table 5) than average for *latiuscula* species subgroup, curvature marked (Table 6), and preapex very short (Table 7). Endophallus unarmed, without dense patches of microtrichia.

Female genitalia. Unknown.

Habitat, habits and seasonal occurrence. The specimen of *C. cuyuteca* was collected in the litter of a pine-oak forest association at mid elevation (1760 m) on 3 August.

Geographical distribution. (Fig. 16). Known from one locality, near Cuautla, Jalisco.

Geographical affinities. The single locality for this species (Fig. 16) is very close to that of one locality of *C. crenatoverpa* (Fig. 15). Possibly these species are microsympatric. Ranges of additional species with ranges overlapping that of *C. cuyuteca* are *C. geminata* (Fig. 17), *C. latiuscula* (Fig. 19), *C. rugofrons* (Fig. 24) and *C. tonatiuh* (Fig. 25).

Morphological affinities. Not postulated.

Material examined. We have seen a single specimen of *C. cuyuteca*. For details, see type material, above.

Cymindis (*Pinacodera*) *geminata*, Hilchie & Ball, new species

(Figs. 4C, 6D, 8D, 10H-J, 12C, 17, 29, 31)
http://zoobank.org/32A59B52-342C-490B-925D-709AE774802D

Type material. HOLOTYPE: Male: "// MEXICO. Morelos. / 4600'. 5.4 mi. e. / Cuernavaca, / VI.29-30.1966 / pedregal / black light // George E. Ball / D.R. Whitehead / collectors //" (USNM).

PARATYPES, 66: **MÉXICO. Chiapas:** 7 km S, Chicoasen, 10.VI.1989, H.F. Howden, at light, 1M (UASM); Manos de Imploran Mirador, near Chicoasen, 27.VI.1987, W.F. Chamberlain, 1F (TAMU); Chorredera [*sic*!] State Park, MV & UV light, 26.V.1987, D.B. Thomas, D.A. Rider, E.G. & T.J. Riley, 3M, 4F (LSUC); Chorreadero, 8 km E, Chiapa de Corzo, 6.VI.1989, H. Howden, 1M, 1F (UASM); Chorreadero, 8 km E, Chiapa de Corzo, 17.VI.1989, H. Howden, 1F (UASM); Chorreadero Canyon, Tuxtla Gutiérrez, at light, 20.VI.1987, W.F. Chamberlain 2M (TAMU); El Chorreadero, 17.VI.1989, P.K. Lago, E. Zuccaro, 3M, 1F (PKLC); El Chorreadero, 10 km W, Tuxtla Gutiérrez, 23.VI.1989, P.K. Lago, E. Zuccaro, 6F (PKLC); El Chorreadero, 10 km W, Tuxtla Gutiérrez, UV light, 23.VI.1989, S, Testa, E. Lago, 1F, (PKLC); Cinco Cerros, 860 m, 31.V.1990, H.&A. Howden, 1M, 1F (UASM); 7.8 km N, Frontera Comalapa, 730 m, UV, 17.VI.1966, G.E. Ball, D.R. Whitehead, 1M, 4F (UASM); 4.8 km N, Tapilula, 10.V.1969, Bright, Campbell, 1M (CNCI). **Guerrero:** 8 km N, Chilpancingo, 24.VIII.1958, H.F. Howden, 1M, (CNCI); Cerro Tuxpan, Iguala, 2.VI.1989, H. Pérez, 2F (CNIN); Cerro Tuxpan, Iguala, 520 m, 25.VI.1987, H. Pérez, 1F (CNIN); 21.2 km NW, jct. Rte. 195, rd. to Filo de Caballo, 1580 m, oak-acacia-palmetto, arroyo, litter, 7-8.VIII.1983, 83-67, H.E. Frania, R.J. Jaagumagi, 1M (UASM); Microondas Tuxpan, 7.III.1987, Harry Brailovsky, 1M (CNIN); Teloloapan, Cerro de la Loma Larga, Villa de Ayala, 1520 m, 18°23'36"N, 100°02'16"W, 14.X.2004, P. Feria *et al.*, collectors, Selva baja caducifolia, vegetacion secundaria arbustiva, col. noche, 1M, 9F (USNM); Teloloapan, El Arenal, 1260 m, 18°17'27"N, 100°03'55"W, 19.X.2004, P. Feria *et al.*, collectors, Selva baja caducifolia, vegetacion secundaria arbustiva, a mano, 1M (USNM); 10 km WSW, Xochipala, 1650 m. 30.VI.1982, J.E. Rawlins, 1F (CMNH). **Morelos:** Cañon de Lobos, 19 km E, Cuernavaca, 1120-1375 m, 3.VII.1992, C.L. Bellamy, 2F (CMNH); Cuernavaca, 1680 m, 6.VI.59, H.E. & M.A. Evans, 1F (CUIC); Cuernavaca, 1680 m, 19-29.VI.1959, H.E. Evans, 1F (CUIC); 5.8 km E, Cuernavaca, 1400 m, pedregal, 24.XI.1965, G.E. Ball, D.R. Whitehead, 1F (UASM); 7.1 km E, Cuernavaca, at light, 6-7.VII.1974, Clark, Murray, Ashe, Schaffner, 1M (TAMU); 8.6 km E, Cuernavaca, 1400 m, pedregal, 25.XI.1965, G.E. Ball, D.R. Whitehead, 1F (UASM); 8.6 km E, Cuernavaca, 1400 m, pedregal, UV, 29-30.VI.1966,

G.E. Ball, D.R. Whitehead, 2M, 3F (UASM). **Oaxaca:** 21 km N, San Pedro Juchatengo, 1440 m, in bromeliads, 23.III.1966, G.E. Ball, D.R. Whitehead, 1M (UASM); 59.2 km NW, Oaxaca, 2260 m, at night, 1.VI.1974, O'Briens, Marshall, 1M (UASM); Tepetlapa, 1M (ZMHB); Rte. 175, 40.6 km S, Uchixtelpec [sic!], 8-9.VII.1972, P.A. Myer, G.E. Ball, 1F (UASM). **Puebla:** 72 km N, Acatlán de Osorio, 30.VII.1963, J. Doyen, 1M, 1F (EMEC).

Specific epithet. The adjectival feminine form of the Latin noun *geminus* or twin, referring to the general similarity in structural features of *C. geminata* to *C. punctifera*.

Type locality. 8.6 km east of Cuernavaca, Morelos, México.

Recognition. Members of this species are recognized by a combination of small size (Table 2), a cluster of enlarged punctures along the posteriolateral area of the vertex of the head capsule, and the irregular anteriolateral striations, which are not expanded onto the frons. For males, the phallus (Figs. 10H, 10J) is slender, relatively flat (displacement relatively slight), and with apical portion relatively narrow and of moderate length.

Specimens of *C. geminata* are markedly similar in external features to those of *C. p. punctifera*, but these two taxa are relatively widely separated geographically (Fig. 17; *cf*. Fig. 20). *Cymindis geminata* is sympatric with *C. p. toltec*. The sculpture pattern resembles that of *C. apache* and *C. yaqui.* Males of *C. geminata* and *C. p. punctifera* are also similar in phallic form (Figs. 10H, 10J; *cf*. 11A, 11B) but the apical portion of the phallus of *C. geminata* is shorter and flatter. Females are easily confused with those of *C. latiuscula*. On average, specimens of *C. geminata* are about 0.9-1.2 mm shorter (SBL) than those of *C. latiuscula* (Table 2).

Description. Specimens of this species are markedly similar to those *C. punctifera* in external features. Size small, form about average for *latiuscula* species subgroup. Data on variation in SBL, the ratio PL/PW, and in phallic measurements (MLp, MWp, MDp, and DPp), are presented in Tables 2 to 7.

Punctation and vestiture. Head capsule: vertex (Fig. 4C, 6D) with four irregular rows of punctures, expanded anterolateral puncture fields, frons with few punctures. similar to *C. apache* and *C. yaqui*.

Thorax. Pronotum (Table 3, Fig. 8D) distinctly narrower than average for *latiuscula* species subgroup.

Elytra. Average for *latiuscula* species subgroup, sutural angle rounded (cf. Fig. 2G).

Male genitalia. Phallus (Figs. 10H–10J). Similar to *C. punctifera* except apex compressed dorso-ventrally. Measurements: phallus very short (Table 4), very narrow (Table 5), curvature very slight (Table 6), and preapex very short (Table 7). Left paramere, lateral aspect, as in Fig. 10I. Endophallus unarmed, without dense patches of microtrichia.

Female genitalia (Fig. 12C). Ovipositor with gonocoxite 1 average for the subgroup, gonocoxite 2 similar in form to *C. crenatoverpa* (Fig 12B) and *C. zapotec* (Fig. 13F), tapered with base much wider than width of the shaft at the insertion point of ensiform setae, apex acutely pointed, scythe-like in shape.

Habitat, habits, and seasonal occurrence. This species occupies dry deciduous woodland, at elevations ranging from about 500 m to about 2300 m, adults occurring on the ground in litter, or in trees, resting in bromeliads. Adult activity extends from May to August, with most captures in June (Fig. 29). Flight occurs at night, as indicated by captures at UV light traps.

Geographical distribution. (Fig. 17). The geographical range of *C. geminata* extends in southwestern México from the Chiapan-Guatemalan border northward to the southern slopes of the Sierra Transvolcanica.

Geographical affinities. This species is sympatric with *C. latiuscula* (Fig. 19), *C. p. toltec* (Fig. 20), *C. tonatiuh* (Fig. 25), and *C. zapotec* (Fig. 28), and possibly with *C. crenatoverpa* (Fig. 15) and *C. huichilobos* (Fig. 18).

Morphological affinities. Based on the structure of the female gonoxoxa (Fig. 12C), *C. geminata* is closely related to *C. crenatoverpa* (Fig 12B) and *C. zapotec* (Fig. 13F), a trend not seen in the form of the male phallus (c.f. Figs. 10H vs. 10C, 10F) for *C. geminata* and *C. crenatoverpa* (males unknown for *C. zapotec*).

Material examined. We have seen 67 specimens of *C. geminata*. For details, see type material, above.

Cymindis (*Pinacodera*) *huichilobos*, Hilchie & Ball, new species

(Figs. 6E, 8E, 10K, 12D, 18, 29, 31)
http://zoobank.org/15428F11-5FC3-4035-BE76-417600C03CD9

Type material. HOLOTYPE: Male: "// MEXICO: Oaxaca km. 117 / Oaxaca-Puerto Angel / 30.I.88 E. Ramirez / A. Cadena / C. Barrera //" collectors (CNIN).

PARATYPES, 16: **MÉXICO. Oaxaca:** km 117, Oaxaca-Puerto Angel [rd.], 30.I.1988, E. Ramírez, A. Cadena, C. Barrera, 1M, 1F (UASM), 10M, 2F (CNIN), 1M, 1F (USNM).

Specific epithet. This is an Aztec word, used as a Latin nominative singular noun in apposition, in recognition of Huichilobos (or Huitzlopochtli), the god of war to whom human sacrifices were made during Montezuma's reign.

Type locality. Km. 117, Oaxaca-Puerto Angel road, Oaxaca, México.

Recognition. Adults of *C. huichilobos* are difficult to separate from many other members of the *C. latiuscula* subgroup. The most notable characters distinguishing males of this species are the decurved angle of the apical portion of the phallus (Fig. 10K) and its large overall size (Tables 4 and 5). Females were identified by general similarity with co-occurring males and the form of the apex of gonocoxite 2, rounded and scoop shaped (Fig. 12D).

Description. Similar in form to *C. punctifera*. Data on variation in SBL, the ratio PL/PW, and in phallic measurements (MLp, MWp, MDp, and DPp), are presented in Tables 2 to 7.

Punctation and vestiture. Head capsule (Fig. 6E): (cf. Figs. 5E, 7E), vertex with 2 to 3 irregular rows of punctures traversing apex, frons smooth with scattered setose punctures, anterior lateral macrosculpture not expanded.

Pronotum. (Fig. 8E) Average in form for *latiuscula* species subgroup.

Elytra. Average for *latiuscula* species subgroup, apices similar to specimens of *C. yaqui*.

Male genitalia. Phallus (Fig. 10K) with apex hooked; relatively long (Table 4) and broad (Table 5),

curvature moderate (Table 6), preapex long (Fig. 7) and slender. Endophallus unarmed, without dense patches of microtrichia.

Female genitalia (Fig 12D). Ovipositor with gonocoxite 1 average for the subgroup, gonocoxite 2 parallel sided from base to insertion point with ensiform setae; apex broadly rounded, scoop shaped, similar in form to that seen in females of *C. rugofrons* (Fig. 13B) and C. *tonatiuh* (Fig. 13C).

Habitat, habits and seasonal occurrence. Recorded from the Pacific coastal region of Oaxaca, this species probably occupies dry to moist deciduous forest, which abounds in that area. See Fig. 29 for data about seasonal activity, and Fig. 31 for elevation.

Geographical affinities. Known from a single locality, the geographical range of *C. huichilobos* (Fig. 18) is not overlapped by the range of any known species of the *latiuscula* subgroup. However, the range of *C. latiuscula* (Fig. 19) extends almost to that locality. Additional possibilities of sympatry include *C. p. toltec* (Fig. 21), *C. tonatiuh* (Fig. 25), and *C. zapotec*. (Fig. 28).

Geographical distribution. (Fig. 18). Known only from the type locality, near the Pacific coast of Oaxaca, west of the Sierra Miahuatlán.

Morphological affinities. The marked similarity in the form of gonocoxite 2 in females of *C. huchilobos* (Fig. 12D) and those found in females of *C. rugofrons* (Fig. 13B) and *C. tonatiuh* (Fig. 13C) suggests a close relationship. The overall form of the male phallus is somewhat similar for these species (cf. Fig. 10K vs. Figs. 10F & 10G, 10H) and at best weakly supports the relationship indicated by the form of gonocoxite 2. Head sculpture is similar in *C. huchilobos* (Fig. 6E) and *C. tonatiuh* (Figs. 5E, 7E), and is quite different in *C. rugofrons* (Figs. 5D, 7D).

Material examined. We have seen 17 specimens of *C. huichilobos*. For details see Type material above.

Cymindis (*Pinacodera*) *latiuscula* (Chaudoir, 1875)

(Figs. 1, 4D, 4E, 5C, 6F, 6G, 8F, 8G, 10L-N, 12E, 19, 21-23, 29, 31)

Pinacodera latiuscula Chaudoir, Bull. Soc. Nat Mosc. XLIX 1875, II, p. 6.

Type material. Oberthür-Chaudoir Collection, a single female, HOLOTYPE, labeled "Ex Musaeo Chaudoir" [red ink], in front of the following box label: "latiuscula / Chaud. / Yucatan / Pilate" (MNHP). —Bates, 1883: 188.

Type locality. The type area of this species is the state of Yucatan, México. The type locality is here designated as Dzibilchaltún Archaeological Zone, *ca.* 16 km north of Merida, Yucatán, México.

Recognition. Adults are recognized by the absence of a well, defined contiguous band of punctures across the vertex and a wider pronotum (PL/PW 0.61-0.73). Other members of the *latiuscula* species subgroup have at least one complete well, defined row of punctures on the vertex. For males, the hooked apex of the phallus, and patches of endophallic microtrichia further delineate the species.

Description. Size and form about average for the *latiuscula* species subgroup, Data on variation of SBL, phallus, and in the ratio PL/PW are presented in Tables 2-7.

Punctation and vestiture. Head (Figs. 4D, 4E, 6F, 6G) with vertex punctures shallow, two lateral fields; frons with fine punctures, lateral sculpture not expanded.

Thorax. Pronotum (Figs. 8F, 8G) surface is coarsely punctate, posterolateral impressions rugulose, broader than average.

Male genitalia. Phallus (Figs. 10L–10N), with preapex slightly flattened, hooked; relatively short (Table 4) and moderately broad (Table 5), curvature about average for *latiuscula* species subgroup (Table 6), and preapex short (Table 7), endophallus (Fig. 10N) with dense patches of microtrichia.

Female genitalia (Fig. 12E). Ovipositor with gonocoxite 1 average for the subgroup, gonocoxite 2 slightly tapered from base to insertion point of ensiform setae; apex bluntly pointed, gently curved.

Variation. Variation is seen in pronotal form (Figs. 8F, 8G) overlapping to some degree with that seen in *C. punctifera toltec* (Figs. 9B, 9C) and *C. zacapa* (Fig. 9G). Specimens from low elevation/tropical lowland tend to have a broader more transverse pronotum (Fig. 22). A lesser degree of variation is seen in the form of the phallus (Figs. 10L–10N).

Habitat, habits and seasonal occurrence. This species occupies a wide range of forest types: principally dry deciduous forest (thorn forest; acacia scrub; oak–acacia forest; oak–pine forest; and secondary forest) at lower elevations, but also pine forest and even cloud forest at higher elevations (Fig. 21). The range in elevation (Fig. 31) of *C. latiuscula* extends from near sea level (15 m) to 1400 m (state of Chiapas).

At higher elevations colder winter temperatures are more prevalent (Fig. 23). In Jalapa, Veracruz, winter temperatures are known to dip to 0º C (elevation about 1500 m). It is likely that adults are sensitive to these lower temperatures (frost intolerant), which limits their presence at the higher elevations. Preference for resting in arboreal bromeliads would expose them to the cold.

Specimens of *C. latiuscula* have been collected in nearly every month of the year (except September and December, Fig. 29). Many were collected from bromeliads, mostly during the period February-March. Teneral specimens (6), collected in July, suggest that individuals overwinter as adults, a surmise borne out by the winter bromeliad collections. Nocturnal flight activity is indicated by collections from UV light traps.

Geographical distribution. (Fig. 19). The geographical range of this widespread species extends from Belize, Yucatan Peninsula and Chiapas northward in the Eastern Versant north of the Tropic of Cancer in the state of Tamaulipas, and in the Western Versant to western Jalisco.

Geographic affinities. The range of *C. latiuscula* overlaps markedly the ranges of *C. geminata* (Fig. 17), *C. punctifera toltec* (Fig. 20), *C. tonatiuh* (Fig. 25), and *C. zacapa* (Fig. 27), and marginally the ranges of *C. p. punctifera* (Fig. 20), and *C. rugofrons* (Fig. 24), and probably the range of *C. huichilobos* (Fig. 18).

Morphological affinities. Based on the shared endophallic armature and generally allopatric distribution pattern, *C. zacapa* may be closely related of *C. latiuscula*. Similar form of gonocoxite 2 in the females also suggests close relationship.

Material examined. In addition to the holotype we have examined 357 specimens from the following localities.

BELIZE: Kayo District: Mountain Pine Ridge, Hidden

Valley, 17º00'N, 89º00'W, 650-700 m, pine-oak savanna, 24.V.1990, M.S. Adams, L.C. Dow, 1M, 1F (CMNH). **MÉXICO:** "México": cribrata, From Muche (Staudinger, Bang-Haas), 1M, 1F (MCZC); 1F (ZMHB); intercepted with plants from México at Miami, Florida, USA, 6. XI.1968, on bromeliads, Byrd K. Dozier, 2M, 1F (FSCA). **Campeche:** 6 km N, Escarcega, 9.X.1976, Cate, Clark, 1F (TAMU); 9.6 km N, Escarcega, 9.X.1976, Cate, Clark, 1M (TAMU). **Chiapas:** 47.2 km N, Arriaga, Rte. 195, 550 m, in bromeliads, 24.II.1966, George E. Ball, D.R. Whitehead, 17M, 21F (UASM); Berriozabal, nr, Rte. 190, 18.VI.1972, P.A. Meyer, G.E. Ball, 2M (UASM); 2 km S, Chicoasén, road to Mirador, 18.VI.1989, H.F. Howden, 1F (UASM); Chorreadera [*sic*!] State Park, 26.V.1987, D.B. Thomas, D.A. Rider, E.G. & T.J. Riley, 1F (LSUC); 48 km E, Comitán, Rte. 190, 24.VII.1963, J. Doyen, 2M 1F (EMEC); Comitán, 52 km E, Rte. 190, 670 m, UV, 1.IX.1965, George E. Ball, D.R. Whitehead, 1F (UASM); Comitán, 52 km E, Rte. 190, 670 m, 14.VI.1966, George E. Ball, D.R. Whitehead, 1F (UASM); 7.8 km N, Frontera Comalapa, 730 m, 17.VI.1966, black light, G.E. Ball, D.R. Whitehead, 1M, 2F (UASM); 12.3 km N, Frontera Comalapa, 790 m, UV, 15-16.VI.1966, George E. Ball, D.R. Whitehead, 2M, 1F (UASM); 47.5 km N, Huixtla, 1310 m, George E. Ball, D.R. Whitehead, 1F (UASM); 3.2 km S, Ixhuatán, 580 m, 16.VI.1965, Burke, Meyer, Schaffner, 1F (TAMU); Hwy 195, 4.5 km N, Ixtapa, 920 m, MV & UV, 24.V.1987, D.A. Rider, E.G. & T.J. Riley, 1M, 1F (LSUC); 26 km SW, Las Cruces, 860 m, UV, 28.VIII.1967, T.L. Erwin, R.E. Leech, G.E. Ball, 2M (UASM); Hwy 190, Oaxaca border, 1000 m, 6.VIII.1989, H.F. Howden, 1M (UASM); Rte. 199, 11.4 km NW Ocosingo, 2.5 km E on side road, oak-pine forest, beating bromeliads, 1400 m, 83-92, 16.IX.1992, G.E. Ball, R.S. Anderson, 1M, 1F (UASM); Ocosingo, 9.8km N, 20. VI.1990, M.C. Thomas, 1M (FSCA); 14.7-20.0 km N, Ocozocuautla, 975 m, in bromeliads, 3-4.III.1966, George E. Ball, D.R. Whitehead, 3M, 4F (UASM); 7.4 km N, Ocozocoautla, 885 m, in bromeliads, 4-5.III.1966, G.E. Ball, D.R. Whitehead, 21M, 18F (UASM); 18.6 km N, Ocozocoautla, 975 m, UV, 10-13.VI.1966, G.E. Ball, D.R. Whitehead 2M, 1F (UASM); 22 km N, Ocozocoautla, 2.VII.1969, Bright, Campbell, 1F (CNCI); 14.9 km N, Palenque, 30 m, 9.VII.1966, G.E. Ball, D.R. Whitehead, 1M (UASM); Parque Nacional El Aguacero, MV & UV, 23.V.1987, D.B. Thomas, D.A. Rider, E.G. & T.J. Riley, 1F (LSUC); Parque Nat. Laguna Belgica, 0.5 km N, 23. VI.1990, M.C. Thomas, 1F (FSCA); Rte. 195, 37.8 km S, Pueblo Nuevo, 1280 m, 28.IV.1966, G.E. Ball, D.R. Whitehead, 2M, 1F (UASM); 4.8 km N, Tapilula, 10.V.1969, Bright, Campbell, 1M (CNCI); 12.8 km SE, Teopisca, 9. VII.1969, Campbell, Bright, 1M (CNCI); 40 km SE. Teopisca, Hwy. 24, 19.V.1969, D.E. Bright, 1F (CNCI); Rte, 190, 21.4 km W, Tuxtla Gutiérrez, 860 m, in bromeliads, 4.II.1966, G.E. Ball, D.R. Whitehead, 18M, 8F (UASM); Rte. 195 *ca.* 8 km S, Junction Rte. 190, and 195, 710 m, thorn scrub, in bromeliads, 79-13, 14.I.1979, G.E. & K.E. Ball, 1M, 1F (UASM). **Guerrero:** Ciudad Altamirano, 6. VII.1984, H. Brailovsky, 1M (CNIN); bei [= near] Chilapa 1F (ZMHB); 7-10 km W, El Ocotito, 15, 16, 22.IX.1989, J.E. Wappes, 1F (JEWC); Copalillo Tecaballo, Papaluta, 790 m, 18º01'56"N, 98º54'47"W, selva baja caducifolia, vegetacion secundaria arborea, 12.VIII.2004, P. Feria *et al.*, 1F (USNM); Coyuca de Catalán, Cerro El Divisadero, Santa Teresa, 390 m, 18º20'38"N, 100º48'07"W, selva baja caducifolia, vegetacion secundaria arbustiva, col. noche, 15.IX.2004, P. Feria *et al.*, 1F (USNM); Coyuca de Catalán, Cerro de Eastaban, Santo Domingo, 270 m, 18º24'41"N, 100º53'59"W, selva baja caducifolia, vegetación secundaria arbustiva, col. noche, 16.IX.2004, P. Feria *et al.*, 1F (USNM); Picaya, El Oyonco, 800 m, 18º38'24"N, 99º31'12"W, selva baja caducifolia, vegetación secundaria arbustiva, 12.VI.2004, P. Feria *et al.*, 3F (USNM); Picaya, Parque Nacional Grutas de Cacauamilpa, 800 m, 18º40'12"N, 99º30'00"W, área agrícola de temporal, UV, 8-9.VI.2004, P. Feria *et al.*, 1F (USNM); 5.3 km E, Papanoa, Rte.200, 110 m, U-V, 79-73, 16.VII.1979, J. S. Ashe, G. E. Ball, D. Shpeley, 1M, 5F (UASM); Tejupilco, El Naranjo Grande, 930 m, 18º47'26"N, 100º21'00"W, selva baja caducifolia, vegetación secundaria arborea, col. noche, 16-17.VII.2004, P. Feria *et al.*, 1M (USNM). **Jalisco:** Municipio La Huerta, Chamela Biol. Sta. roadside sweep, 27.VII.1996, W. Godwin, 1F (TAMU); Estación Biológica Chamela, at light, 20-27.VII.1984, J.A. Chemsak, J.T. Doyen, 3F (EMEC); Estación Biológica Chamela, 25. VIII.1990, C. Mayorga, A. Cadena, J. Martinez, 1F (CNIN); vic. Estación BiológicaChamela, CNIN, UV light, 9- 14. VII.1993, Morris, Huether, Wappes, 1M, 1F (RFMC). **Oaxaca:** 4.3 km NW, El Cameron [*sic!*], taken at light, 24.VII.1973, Mastro, Schaffner, 1F (TAMU); 4.3 km NW, El Cameron [*sic!*], taken at light, 21.VII.1974, Clark, Murray, Ashe, Schaffner, 2F (TAMU); 4.3 km NW, El Cameron [*sic*!], UV, 21.VII.1974, Clarke, Murray, Ashe, Schaffner, 3F (TAMU); Microondas San Cristóbal, km 1.4, 10.2 km SE, El Camarón, 1120 m, riparian, oak-pine forest, 21-22.VI.1979, 79-46, J.S. Ashe, G.E. Ball, D. Shpeley, 2F (UASM); 9.6 km W, Tehuantepec, UV, 2.VII.1964, A.G. Raske, 1M, 2F (EMEC); 16.8 km W, Tehuantepec, 22. VII.1974, Clark, Murray, Ashe, Schaffner, 1M, 4F (TAMU); 23 km W, Tehuantepec, 245 m, 30.VII.1977, E. Fisher, P. Sullivan, 1F (CASC); 59.5 km NW Tehuantepec, 457 m, 12.VIII.1974, O'Briens & Marshall, 1M (UASM); 89.6 km NW, Tehuantepec, 27.II.1963, J. Doyen, 2M, 1F (EMEC); 3.4 km NW, Totolapan, 11-17.VII.1981, Bogar, Schaffner, Friedlander, 1M (TAMU). **Puebla:** 23.2 km SE, Acatlán, 21.VII.1981, Bogar, Schaffner, Friedlander, 1F (TAMU); Izúcar de Matamoros, San Isidro, 1310 m, 18º33'05"N, 98º25'19"W, área agrícola temporal, col. noche, 26. VI.2004, P. Feria *et al.*, 1M, (USNM); nr. Tepexco, Rte. 115, 1220 m, 10.VIII.1965, G.E. Ball, D.R. Whitehead, 1F, (UASM). **San Luis Potosi:** El Banito, 60 m, 27.VI.1982, J.E. Rawlins, 1F (CMNH); 2.9 km N, El Naranjo, 300 m, 4 & 13.X.1965, G.E. Ball, D.R. Whitehead, 4F (UASM); Rte. 80, 5.8 km W, El Naranjo, 370 m, 13-14.X.1965, G.E. Ball, D.R. Whitehead, 4F (UASM); El Salto, nr. El Naranjo, 29.VI.1965, P.J. Spangler, 3F (USNM); El Salto, 520 m, 25.VIII.1954, J.G. Chilcott, 1F (CNCI); El Salto de Agua, 23-24.VIII.1960, H.F. Howden, 1F (CNCI); Microondas Ciudad Valles, 2.IX.1978, 1F (CNIN); 11.6 km W, Rio Verde, 2.VI.1987, R.S. Anderson, 1M (UASM). **Tamaulipas:** El Monte, 1709, Orchids, 1.I.1948, 1M (USNM); El Salto Falls, 41.6 km W, Antigua Morelos, 11-14.VII.1963, Duckworth Davis, 2M (USNM); 8 km E, Nuevo Morelos, 520 m, 16.VIII.1971, C. &. L. O'Briens, B. Marshall, 1M (UASM); Río Sabinas, W, El Encino, 180 m, Lot B, bromeliads, 11.X.1965, G.E. Ball, D.R. Whitehead, 1F (UASM); 33 km E, Villa de Casas, 460 m,

5.VII.1965, G.E. Ball, D.R. Whitehead, 1F (UASM). **Veracruz:** Atoyac, A.B. Lau, 22.X.1965, 1F (USNM); Rte. 180, 26.1 km S, Catemaco, 210 m, in bromeliads, 6. III.1966, G.E. Ball, D.R. Whitehead, 9M, 6F (UASM); Córdoba, 4.VII.1965, A.B. Lau, 1M (USNM); Córdoba, 5. VII.1965, A.B. Lau, 1M (USNM); Córdoba, 6-9.VII.1965, A.B. Lau, 1F (USNM); Córdoba, 17.VI.1997, Koebele Coll., 1M (CASC); Fortín de las Flores, 26-30.VI.1963, D.R. Whitehead, 1M, 1F (UASM); Fortín de las Flores, 890 m, 22.I.1966, G.E. Ball family, 1M (UASM); Rte. 143, 54.9 km E, Huatusco, 150 m, thorn forest, in bromeliads, 18. XII.1978, G.E. & K.E. Ball, 10M, 8F (UASM); 8 km NE, Independencia, Troncones Highway, 29.IX.1976, W.E. Clark, 1M (TAMU); Jalapa, Hoege — (1F (labeled "Donated by F. du Cane Godman 1907", (AMNH); 1F (ANSP); 3M, 4F (MCZC); 5M, 6F (USNM); 3M, 1F (ZMHB)); Rte. 140, 7.5 km E, Jalapa, in bromeliads, 1100 m, 9.IV.1966, G.E. Ball, D.R. Whitehead, 4M, 2F (UASM); Rte. 140, 9.3 km E, Xalapa [sic!], in bromeliads, 24. VII.1967, G.E. Ball, T.L. Erwin, R.E. Leech, 1M (UASM); Rte. 140, 19 km E, Xalapa, in bromeliads, 790 m, 9.IV.1966, G.E. Ball, D.R. Whitehead, 1M (UASM); Rte. 140, 35.2 km E, Xalapa, in bromeliads, 310 m, 9.III.1966, G.E. Ball, D.R. Whitehead, 1F (UASM); 11.2 km SW, Minatitlán, 230 m, 2.VIII.1974, CW. & L. O'Brien, Marshall, 2M (UASM); 6.4 km SW, Puente Nacional, 180 m, in bromeliads, 8. III.1966, G.E. Ball, D.R. Whitehead, 16M, 11F (UASM); Rancho Clacotengo, *ca.* 2-5 km N, Fortín de Las Flores, 1120 m, in bromeliads, 78B-33, 21.XII.1978, G.E. & K.E. Ball, 1M, 4F (UASM); Rte. 140, Tamarindo, 90 m, in bromeliads, 9.I.1966, G.E. Ball family, 2M (UASM); Tampico, 22.IX, E.A. Schwarz, 1M (USNM); 32 km S Misantla, beating flowers *Hampea nutridea* (male), 22. XI.1976, W.E. Clark, 1M (TAMU). **Yucatán:** Chichen Itza, 2 km E, black light trap, 16.VI.1990, M.C. Thomas, 1M, 2F (FASC); Dzibilchaltún, *ca.* 16 km N, Mérida, 15 m, in bromeliads, 19.IV.1966, G.E. Ball, D.R. Whitehead, 1F (UASM); Ruinas de Kabah, Rte 180, 30 m, 13.I.1966, G.E. & K.E. Ball, 2M, 3F (UASM); 7 km W, Tzucacab, 20.X.1991, R. Turnbow, 1M (RHTC); 15 km S, Vallodolid, 25.X.1991, R. Turnbow, 1M (RHTC); 2 km S, Xcalacoop, 23.X.1991, R. Turnbow, 1M (RHTC).

Cymindis (Pinacodera) punctifera (LeConte, 1884)

(Figs. 2C, 2D, 3, 5A, 5B, 7A–7C, 9A–9C, 11A–11E, 12F, 13A, 20–23, 30, 31).

Pinacodera cribrata Chaudoir 1875: 5 (not *Cymindis (sensu stricto) cribrata* LeConte, 1859: 2).

Type material. Three specimens, male and two females, in front of the following box label: "cribrata/ Chaud/ Mexique/ Sallé". LECTOTYPE here selected: male, labeled "Ex Musaeo/ Chaudoir" [red print]. PARALECTOTYPES. Two females, each labeled same as lectotype. – Bates, 1883: 188 (MNHP).

Lebia punctifera J. LeConte 1884:2. Type material single female, HOLOTYPE, labeled: "Type 5800" [red paper, number handwritten]//; L. puncti/ fera/ Lec." [handwritten]; "*Pinacodera*/ *punctifera*/ LeConte/ recognized by G.E. Ball & G.J. Hilchie (1979) as HOLOTYPE" [handwritten] (MCZC). – Csiki, 1932:1330.–Madge, 1967: 218.

Cymindis (Pinacodera) punctifera; Bousquet and Larochelle, 1993:269. Bousquet, 2012:395.

Notes about names. The types of *Pinacodera cribrata* and *Lebia punctifera* are believed to be conspecific, based on a population variation pattern that bridges their morphological differences. Although *C. (Pinacodera) cribrata* (Chaudoir (type area México) is senior synonym, it is also a junior secondary homonym of *Cymindis (Tarulus) cribrata* LeConte, 1859 (type area, Kansas), and is thus unavailable. The next available name is *C. punctifera* (LeConte), which is, accordingly, the valid name of the species.

Recognized here as polytypic, *C. punctifera* includes two subspecies (Fig. 20). The range of the more northern subspecies includes northern México and southwestern U.S.A., within which is the type area (Arizona) of the *C. punctifera* (LeConte). The range of the one southern subspecies includes southern and central México, within which is the type area of the *C. cribrata* (Chaudoir). Therefore, the name of the more northern subspecies is *C. punctifera punctifera* (LeConte). Because of the homonymy of *C. cribrata*, the southern subspecies is without an available name. As a replacement name, we propose here *C. punctifera toletc*, new name.

Recognition. Due to extensive variation in phallic features as well as external features, distinguishing specimens of *C. punctifera* from those of other members of the *latiuscula* species subgroup is difficult, and at the species level, one is compelled to work in generalities. Size (SBL) is relatively small, on average for the *latiuscula* species subgroup (Table 2). The phallic preapex is more or less cylindrical (Figs. 11A-11E) and relatively long (Table 7). Head and pronotal punctation vary sufficiently to extend over the range of the *latiuscula* species subgroup for these features. Nonetheless, they are useful at the subspecies level. Geographical range is extensive, from the Isthmus of Tehuantepec in southern México to southern Arizona, U.S.A.

The stout form of gonocoxite 2 is most similar to females of *C. apache*.

Two relatively widespread forms of phallic preapex are included in this species, correlated with geographical distribution. However, some samples include intermediates between these forms. The correlation and variation provide both the basis for inclusion of the two genitalic groups in one species and the basis for recognition of two subspecies. For details, see below.

Cymindis (*Pinacodera*) *punctifera punctifera* (LeConte, 1884)

(Figs. 2C, 2D, 3, 5A, 7A, 9A, 11A, 11B, 12F, 20—23, 30, 31)

Recognition. Adults of *C. punctifera punctifera* are likely to be confused with those of *C. apache* and *C. yaqui*, the three taxa whose geographical ranges overlap extensively in southwestern U.S.A. and adjacent northwestern México. All three are similar in body form, integumental macrosculpture, and color (dorsal surface of body rufotestaceous to rufous). Although size overlap among these taxa is more or less extensive (Table 2), *C. p. punctifera* is smaller than *C. apache* (no overlap in SBL between samples of the two taxa), and on average smaller than *C. yaqui*. Both *C. apache* and *C. p. punctifera*

differ from *C. yaqui* in form of the elytral apical sutural angle (round in *C. apache* (Fig. 2G) and *C. p. punctifera*), angulate in *C. yaqui* (Fig. 2H)). In phallic details, males of these three taxa differ markedly: in form of apical portion (narrower and apex knobbed in *C. p. punctifera* (Fig. 11B), broadly spatulate in *C. apache* (Fig. 10B), narrow and more or less pointed in *C, yaqui* (Figs. 11K, 11L); and in curvature of the shaft (displacement, Table 6).

Morphological distinction between this subspecies and *C. p. toltec* is discussed below, under the latter subspecies. Geographically, *C. p. punctifera* ranges south in western México to about 27° N. Lat., or the Rio El Fuerte Basin, being replaced further south by *C. p. toltec.*

Description. Size relatively small, body form about average for *latiuscula* species subgroup. Data on variation in SBL, the ratio PL/PW, and in phallic measurements (MLp, MWp, MDp, and DPp), are presented in Tables 2 to 7.

Punctation and vestiture. Head (Figs. 5A, 7A), vertex with two to three irregular transverse rows of coarse punctures; frons smooth, anteriolateral sculpture not expanded. Microsculpture various, obsolete on most specimens, partial to well developed on some specimens from Pima County, Arizona.

Thorax. Pronotum average in form for *latiuscula* species subgroup (Fig. 9A).

Elytra. Average for *latiuscula* species subgroup (Fig. 2C).

Male genitalia. Phallus (Figs. 11A, 11B) with preapex cylindrical, apex distinctly knobbed, bulbous; short (Table 4), narrow (Table 5), curvature slight (Table 6), and preapex moderately long (Table 7). Endophallus without microtrichial patches.

Female genitalia (Fig 12F). Ovipositor with gonocoxite 1 average for the subgroup, gonoxoxite 2 with a slight taper from base to insertion point with ensiform setae; apex bluntly rounded, very similar in form and proportions with females of *C. punctifera toltec* (Fig. 11F) and *C. apache* (Fig. 12A).

Habitat, habits and seasonal occurrence. This subspecies is known from areas that experience significant periods of below freezing temperatures. It is a resident of oak-pine montane forest, occurring on the ground in leaf litter, or in vegetation (specimens beaten from oak and juniper). Elevational range extends from near sea level to 3060 m with a mean collection elevation of 1600 m (Fig 31). Adults readily fly to lights (many were collected from UV light traps), which implies that most of the habitat notes are probably about beetles which landed on or were resting on/in vegetation after dispersing. Adults have been collected in every month of the year from February through November with the largest number of captures made during the months of summer (Fig. 30).

Geographical distribution. (Fig. 20). The range of *C. p. punctifera* includes northeastern México from 25° N. lat northward to southwestern Texas, and westward to southeastern Arizona. To the west in México, the range includes the Sierra Madre Occidental from the Rio El Fuerte Basin in western Sonora and Chihuahua northward to the slopes of the isolated mountain ranges (Chiricahua, Huachuca, Pajarito, Pinaleño, Santa Catalina, Santa Rita, etc.) in southeastern Arizona.

Geographical affinities. In Arizona and New Mexico, the range of *C. p. punctifera* (Fig. 20) completely overlaps the ranges of *C. apache* (Fig. 14) and *C. yaqui* (Fig. 26). To the east in the Mexican state of Tamaulipas, the range of *C. p. punctifera* overlaps narrowly the range of *C. latiuscula*.

Material examined. We have examined 1144 specimens collected in the following localities in México and southwestern U.S.A. **MÉXICO. Chihuahua.** Basuchil, 1830-2140 m, VIII.1929, Y. Meria, 1F (CASC); Cerro San Luis, 1767 m, 13.VIII.1981, S. McCleve, P. Jump, 1F (UAIC); 67.2 km N, Chihuahua, 4.8 km W, Parrita, 1560 m, 2.VI.1981, J.K. Liebherr, 1M, 1F (CUIC); Cerro Venado, 37 km N Temosachic, ca. UV light, 2161 m, 19.VII.1984, S. McCleve & P. Jump, 1M (UASM); 6.4 km N, Los Chinacas, nr Sonora border, 1271 m, UV, 9-10.VII.1989, S. McCleve, 1F, (UASM); 48.1 km N, Madera, 2480 m, oak-pine forest litter, 83-26, 9.VII.1983, H.E. Frania, R. Jaagumagi, D. Shpeley, 1M (UASM); 8 km W, Parrita, Santa Clara Canyon, 21.VI.1956, J.W. MacSwain, D.D. Linsdale, 1F (EMEC); 37 km SW Ciudad Jiménez, ca. UV light, 1539 m, 17.VII.1984, S. McCleve & P. Jump, 1F (UASM); 4 km E, Perdernales, UV light, ca. 2234 m, 18.VII.1984, P. Jump & S. McCleve, 8M, 6F (UASM); 9.7 km S, Yecora (Sonora), 1752 m, UV, 2-3.VII.1990, S. McCleve 1M, 1F (UASM), 10 km SW Yecora, Sonora, in the Sierra Madre Occidental, 1830 m, oak-pine forest, beating vegetation, 93-17, 6-7. VII.1993, S. McCleve, K.E. & G.E. Ball, 1M (UASM). **Coahuila:** 6.4 km W, Saltillo, 1710 m, 20.VIII.1971, O'Briens, Marshall, 1M (UASM); Rte. 57, 16 km SE, Saltillo, 2230 m, 27.V.1981, J.T. Doyen, J.K. Liebherr, 1F (EMEC); 52.8 km SE, Saltillo, near Jame, 2290 m, 25. VII.1963, at light, H.F. Howden, 1M (CNCI). **Nuevo Leon:** 4.8 km E, Galeana, 1530 m, 7-8.VIII.1963, Duckworth, Davis, 1M (USNM); 11.2 km ESE, Galeana, 1680 m, 22. VI.1982, J.E. Rawlins, 1F (CMNH); 32 km W, Linares, 8. XI.1946, E.S. Ross, 1M (CASC); Paso Mamulique, 650 m, 16.VII.1982 1F (MAIC), 10 km S Monterrey, Chipinque Mesa, UV light, 1371.6 m, 2.VI.1983, M. Kaulbars, R.S. Anderson, 1F (UASM). **Sonora:** 11.2 km W, Alamos, light coll, 8.VIII.1964, J.A. Chemsak, J. Powell, 1F (EMEC); same, UV, 18.VII.1967, M.S. Wasbauer, 1F (CDAE); Bacanora, 14.2 km (by air) SW of, Rancho las Tierras de Jiménez, Sierra de Murietta rocky slope, oak woodland 1387 m 28.90111 -109.51417, 2.VIII.2014, T.R. Van Devender, 1M (UASM); 7 km N, El Coyote, 26.VI.1981, 1200 m, at light, S. McCleve, 2M, 1F (UAIC); Rte 15, 51.2 km S, Hermosillo, 230 m, desert, 27.VII.1967, G.E. Ball, T.L. Erwin, R.E. Leech, 1F (UASM); Esqueda, 7.9 km (by air) ESE of, 30.6975°N, 109.5075°W, Chihuahuan desert scrub, 1275 m, 16.VIII.2017, T.R. Van Devender, A.L. Reina-G. 1M (UASM); 22.1 km SE Huachinera, Sierra Huachinera, oak-pine forest, 2090 m, 82-05, 3-4.VIII.1982, G.E. & K.E. Ball, S. McCleve, 2M, 1F (UASM); 5.1 km NW, Huicoche, near Chihuahua border, UV, 1577 m, 11-13. VII.1989, S. McCleve, 3F (UAIC); Mazatán, 10.7 km (by air) NW of, Sierra Huerfana, 1.6 km (by air) WSW of Rancho El Bachan gentle granatic slopes, oak woodland 1381 m 29.09083° N -110.20472° W, 28.VII.2014, T.R. Van Devender, 6M 3F (UASM); 17 km SW, Moctezuma, at light, 940 m, 27.VI.1981, S. McCleve, P. Jump, 1F (UAIC); 17 km SW Moctezuma, at light, 944 m**,** 1-12.VII.1983, S. McCleve & P. Jump, 3M, 3F (UASM); 19.1 km. S Moctezuma, on Rte. 14, Sinaloan legume forest, UV light,

2000 m, 93-14, 4.VII.1993, S. McCleve, G.E. & K.E. Ball, 1F (UASM); 19 km NW, Nacori Chico, 930 m, desert, beating, 82-09, 5.VIII.1982, G.E. & K.E. Ball, S. McCleve, 1M, 1F (UASM); Observatorio de Astrofísica Guillermo Haro, vicinity of, Sierra la Mariquita, 31.05444°N, 110.38250°W, 9.4 km (by air) NNW of Cananea, rocky slope, pine-oak forest, 2422 m, 2.VIII.2013, T.R. Van Devender, J.D. Palting, 1F (UASM); Rancho Aguajia, 16 km NW Yecora, oak-pine forest, UV light, 1311 m, 93-28 & 29.VII.1987, S. McCleve, 7M, 5F (UASM); Rancho El Metate, 7.4 km (by air) SSW Naco, E base of Sierra San José, 31.25861°N, 109.95917°W, desert grassland, oak woodland, 1654 m, 16.IX.2017, T.R. Van Devender, J.D. Palting, 1M, 1F (UASM); Rancho Las Alisos, 9.4 km (by air) WSW of Aconchi, Sierra Anchonchi, 27.79833°N, 110.31972°W, rocky canyon Sycamore riparian deciduous forest, oak woodland on slopes, 1301 m, 2.VII.2013, T.R. Van Devender, A.L. Reina-G. 3M, 8F (UASM); Rancho Las Avispas, 15.5 km (by air) SW of Nogales, Sierra Las Avispas, 31.19278°N, 111.10139°W, rocky canyon riparian forest, oak woodland, 1200 m, 21.VII.2012, T.R. Van Devender, A.L. Reina-G. 1M, 2F (UASM); Rancho Madroño, Sierra Huachinera, 2200 m, 25.VI.1981, S. McCleve, P. Jump, 1M (UAIC); Rincón de Guadalupe, 16.5 km (by air) ENE of Bacadehuaci, Arryo Campo Los Padres (Rio Riito drainage), Sierra de Bacadehuaci, 29°50'40"N, 108°58'37"W, rocky canyon and mountainside, Sycamore, *Cupressus arizonica* riparian forest, pine-oak forest on slopes, 30.III.2012, T.R. Van Devender, 1F (UASM); Río Mayo, San Bernardo, 15.VII.1935, H.S. Gentry, 1M (CASC); Río Nácori, 20 km E, Nácori Chico, 1050 m, oak forest, UV, 83-03, H.E. Frania, R.J. Jaagumagi, D. Shpeley, 3F (UASM); Rio Tres Rios, 18 km N, Mesa de Tres Rios, oak forest, litter, 1450 m, 5.VII.1983, H.E. Frania, R.J. Jaagumagi, D. Shpeley, 1F (UASM); Rte. 16, 32.3 km E Rio Yaqui, thorn scrub-oak woodland, UV light, 917 m, 26-27.VII.1987, S. McCleve, 3F (UASM); San Carlos Bay, 10.VIII.1960, P.H. Arnaud, Jr., E.S. Ross, D.C. Rentz, 4M (CASC); Sierra Álamos, 2.7 km S, 1.9 km W Álamos, thorn forest, UV light, 518 m, 30-31.VII.1987, S. McCleve, 6M, 6F (UASM); Sierra Buenos Aires, 30.72668°N, 109.82116°W, rocky mountainside with pines, Hg vapor light 1701m, 14.VIII.2916, D. Shpeley, 01-16, 1M (UASM); Sierra Juriquipa, Rancho la Zulema, 15.9 km (by air) SE Nacozan de Garcia, 30.28389° N, 109.56028°W, rocky mountainside, oak woodland, 1687 m, 15.VII.2017, T.R. Van Devender, J.D. Palting, 2M, 2F (UASM); Sierra Madre Occidental, 6.1 km S, Santa Rosa, Sinaloa, thorn scrub, UV light, 1900 m, 93-22, 9.VII.1993, S. McCleve, G.E. & K.E. Ball, 7M, 4F (UASM); Sierra Madre Occidental, 11.6 km NW Yecora, oak-pine, roadside, 1900 m, 93-19, 8.VII.1993, S. McCleve, G.E. & K.E. Ball, 1M (UASM); Sierra Madre Occidental, 23.2 km NW Yecora, oak forest, UV light, 1680 m, 93-20, 8.VII.1993, S. McCleve, G.E. & K.E. Ball, 1F (UASM). **Tamaulipas:** Sierra Pichachos, 21.XI.1978, J.W. Johnson, 1M (TAMU). **U.S.A. Arizona:** "Arizona", 1M (ANSP). *Cochise County*: (non-montane localities), Gleeson, ex cowpie, 9.VIII.1979, F.G. Andrews, 1F (CDAE); Leslie Canyon, 25.6 km N, Douglas, 1432 m, UV, Loc. 21, 18.VII.1976, G.E. Ball, J.M. Campbell, P.M. Hammond, 2M, 1F (UASM); Palmerlee, H.A. Kaeber (USNM) (1M; VII, 1M; VII.1917, 1M; VII.1920, 1M; VI.1927, 1F); *Chiricahua Mountains,* "Chiricahua Mts": 9.VII.1908, 1M (CASC); 30.VII.1927, J.A. Kusche, 1M, 2F (CASC); "Chiricahua Mts", D.J. & J.N. Knull (OSUC)—2.VII.1929, 1F; 5.VII.1949, 1F; 26.VII.1952, 1F; 13. VII.1953, 1F; 15.VII.1953, 2F; 17.VII.1957, 2F; 22. VII.1957, 3F; 27.VII.1957, 1F; 2.VII.1959, 4F; 16. VII.1959, 2F; Chiricahua National Monument, nr. entrance, at night, 13.V.1972, C. O'Brien, Marshall, 1F (USNM); Ash Canyon, 24.VII.1968, D.E. Bright, 1M, 1F (CNCI); Ash Canyon, 11.2 km W Palominas, UV light, 1550 m, (TAMU)--6.VIII.1995, 1F; 21.VIII.1995, 1F; 14.X.1995, 1F; *Chiricahua Mountains, Cave Creek Canyon*: Cave Creek, 1530-1830 m, 26.VIII.1927, J.A. Kusche, 1M (CASC); Cave Creek Canyon, D.L. Gustavson, 3.VIII.1986, 2M (MTEC); Cave Creek Canyon, UV, 1560 m, 31. VII.1988, D.L. Gustavson, 1F (MTEC); Cave Creek Canyon, 1.VII.1988, D.L. Gustavson, 1F (MTEC); Cave Creek Canyon, 6.4 km SSW, Portal, 1620-1650 m, 23. VIII.1981, R. Davidson, 1F (CMNH); Cave Creek Canyon, 24-28.VII.2011, J. Wappes, B. King, 1M, 1F (UASM); Cave Creek Canyon, 9.6 km W, Portal, 14.VII.1959, G.E. Ball family, 1M (UASM); Cave Creek Ranch, 1530 m, at light, 6-8.VIII.1960, G.E. Ball family, R.B. Madge, 1F (UASM); Cave Creek Canyon, near Portal, 31° 52' 59"N 109° 10' 49"W, UV, 1570 m, 5.VIII.2003, E. Riley, 3M, 6F (TAMU), 1M, 1F (EGRC); Cave Creek Canyon, near Southwest Research Station, 31° 53' 38"N 109° 12' 53"W, UV, 1720 m, 6.VIII.2003, E. Riley, 2M, 6F (TAMU), 1M, 2F (EGRC); Cave Creek Ranch 1520 m, G.E. Ball family, R.B. Madge, - (9.VIII.1960, 1M, 2F; 10.VIII.1960, 1M, 1F; 25-31.VIII.1960, 2F); Cave Creek Ranch, Portal, 29-30. VIII.1971, E.G. Linsley, 1M (EMEC); Cave Creek Ranch, Portal, 20-24.VIII.1972, E.G. Linsley, 2M (EMEC); Cave Creek, South Fork, UV, Lot No. 135, 9.VII.1964, J. Stibick, 1M, 2F (USNM); Cave Creek, South Fork, UV, Lot No. 136, 10.VII.1964, J. Stibick, 1M, 1F (USNM); Cave Creek, South Fork, UV, 1620 m, Lot No. 140, 11.VII.1964, J. Stibick, 2M, 1F (USNM); South Fork, Lot No. 814, 10. VII.1966, R.H. Arnett, Jr., E.R. Van Tassell, 4F (FSCA); Lot No. 817, 11.VII.1966, R.H. Arnett, Jr., E.R. Van Tassell, 1F (FSCA); Lot No. 824, 13.VII.1966, R.H. Arnett, Jr., E.R. Van Tassell, 1M, 2F (FSCA); Lot No. 827, 15. VII.1966, R.H. Arnett, Jr., E.R. Van Tassell, 1F (FSCA); *Chiricahua Mountains*: Chiricahua RXR Station, 10. VIII.1972, S. McCleve, 3F (UAIC); Herb Martyr Forest Camp, 1780 m, UV, 1.VIII.1966, R.G. Beard, 3F (CUIC); Herb Martyr Camp, 10 km. SW Portal, 1700 m, riparian forest, ex f.i.t., S&JP 2000-17, 9.V.2000, S. & J. Peck, 3M (CMNC); Onion Saddle, 2320 m, pine-oak, UV, R.G. Beard, 7.VII.1966, 1F (CUIC); Paradise, 1530-1830 m, 22.VIII.1927, J.A. Kusche, 1F (CASC); 3.2 km N, Paradise, 1620 m, 6-8.VII.1964, D.R. Davis, 2F (USNM); 6.4 km. SW Paradise, 5.VIII.1967, F.G. Andrews, 1M, 3F (CDAE); Parker Canyon Lake, 25.VII.1968, D.E. Bright, 1M, 1F (CNCI); Parker Dam Lake, 1770 m, at light, 6.VIII.1979, J.K. Liebherr, 1F (CUIC); Pinery Canyon, 3M, 3F (TAMU); Portal, 21.VII.1965, W. Rosenberg, 1M, 1F (USNM); Portal, 29.VII.1965, W. Rosenberg, 5M, 4F (USNM); Portal, Mont. Cazier, 3.VIII.1964, 1M (CMNH); Portal, VII.1976, Dr. Lenczy, 1F (CMNH); Portal, 5.VIII.1965, B.K. Dozier, 1F (FSCA); Portal, 10.VI.1967, D.J. & J.N. Knull, 2M (OSUC); Portal, 24.VI.1967, B.A. Tilden, 1F (USNM); Portal, at light, 14.VII.1963, A. Raske, 1F (EMEC); 1.6 km S, Portal, Mont Cazier, (CMNH)-19.

VI.1965, 1F; 3.VII.1965, 1M, 2F; 3.2 km S, Portal, 19. VI.1965, Mont Cazier, 2F (CMNH); 8 km. W, Portal, 2. IX.1976, F.G. Andrews, 1M, 3F (CDAE); 30.4 km W, Portal, 13.VI.1968, T.L. & L.V. Erwin, 1F (USNM); near Portal, 28.VII-7.VIII.1966, 1M (TAMU); near Rucker Lake, 10.VII.1974, S. McCleve, 4F (UAIC); *Southwestern Research Station*: on horse dung, 9.VI.1956, 1650 m, O.L. Cartwright, 1F (USNM); 1650 m, 4.VII.1956, O.L. Cartwright, 3F (USNM); 8-10.VII.1956, O.L. Cartwright, 1F (USNM); 23.VII.1956, C. & M. Cazier, 1F (AMNH); at light, H.F. & A. Howden, 10.VI.1956, 2F (CNCI); H.F. & A. Howden, 12.VI.1956, 1F (CNCI); at light, H.F. & A. Howden, 17.VI.1956, 1F (CNCI); H.F. & A. Howden, 24. VI.1956, 1F (CNCI); H.F. & A. Howden, 30.VI.1956, 1F (CNCI); H.F. & A. Howden, 7.VII.1956, 2F (CNCI); H.F. & A. Howden, 8.VII.1956, 3F (CNCI); H.F. & A. Howden, 9.VII.1956, 2F (CNCI); H.F. & A. Howden, 7.VII.1956, 2F (CNCI); 10.VI.1956, H.F. & A. Howden, 1F (FSCA); Lot 289, 14-22.VII.1957, R.H. Arnett, Jr., 2F (FSCA); Lot 309 13.VIII.1957, R.H. Arnett, Jr., 1F (FSCA); 1650 m, 13. VI.1958, C.D. MacNeill, 1F (CASC); 17.VI.1958, C.D. MacNeill, 1F (CASC); 23.VII.1961, J.M. Linsley, 1M (EMEC); 1650 m 31.VII-2.VIII.1964, D.R. Davis, 1F (USNM); 23.VI.1967, B.A. Tilden, 1F (USNM); UV, 1. VIII.1967, R.E. Frisbie, 1M (UCRC); 13.VII.1969, L.L. Pechuman, 1F (CUIC); 11-28.VIII.1980, L.L. Lampert, 2F (MTEC); W. Rosenberg, (USNM) — (16.VIII.1977, 1F; 17.VIII.1977, 2F; 18.VIII.1977, 2F; 20.VIII.1977, 2F; 21. VIII.1977, 1M, 4F; 22.VIII.1977, 1M, 4F; 23.VIII.1977, 2F; 24.VIII.1977, 3F; 25.VIII.1977, 2M, 2F; 26.VIII.1977, 1F; 27.VIII.1977, 1M, 1F; 28.VIII.1977, 3F; 29.VIII.1977, 2F; 30.VIII.1977, 2F; 31.VIII.1977, 1M, 1F; 1.IX.1977, 2F; 2.IX.1977, 2F; 3.IX.1977, 1F; 4.IX.1977, 3F); Southwest Research Station, 8 km SW Portal, 31° 54' 02"N 109° 13' 39"W, at light, 1645 m, 16-22.VIII.2000, M.J. Yoder, 1F (TAMU); near Southwest Research Station, near Portal, 31° 52' 55"N 109° 13' 04"W, UV, 1675 m, 4. VIII.2003, E. Riley, 1M, 4F (TAMU); Stewart Camp, 1.6 km W, Portal, UV, 18-20.VII.1971, J.T. Doyen, 2M, 5F (EMEC); Stewart Camp, 4.8 km W, Portal, UV, 25. VII.1971, J.T. Doyen, 3M 4F (EMEC); Texas Canyon, 1520 m, 23.IX.1927, J.A. Kusche, 1M (CASC); Texas Canyon, 1530-1830 m, 30.IX.1927, J.A. Kusche, 1M, 1F (CASC); West Turkey Creek, at light, 20.VI.1972, S. McCleve, 1F (UAIC). *Dragoon Mountains*, Cochise Stronghold: light trap, 13.VIII.1958, C.W. O'Brien, 5F (USNM); 15.VIII.1957, M.C. Cushner collection, 1F (CASC); 29.III.1968, R.F. Sternitzky, 1M (CNCI); Cochise Stronghold, 12.VII.1978, G.J. Hilchie, 5M, 11F (GJHC); 5.6 km W Dragoon, 22.VII.1985, P.K. Lago, 2M (PKLC); Cochise Stronghold, sweeping, feeding on mesquite, at night, 8.VIII.1979, F.G. Andrews, 8M, 5F (CDAE). *Cochise County*: *Huachuca Mountains,* "Huachuca Mountains": Charles Palm Coll., 1F (AMNH); 1M (CUIC); 1M (CUNY); Brooklyn Mus. Coll., 1F (USNM); VII.1905, 1M, 1F (USNM); E. Shoemaker Coll., VII, 1905, 1M, 1F (CASC); 4F (USNM); J.W. Green Coll., 1M, 2F (CASC); 11. IX.1928, E.R. Leach, 1F (CMNH); Bear Creek, Montezuma Pass, 30.VI.1956, H.F. & A. Howden, 2F (CNCI); Bear Creek, Montezuma Pass, 1.VII.1956, H.F. & A. Howden, 1M, 2F (CNCI); Montezuma Pass, 6.VII, H.F. & A. Howden, 1M, 1F (CNCI); *Carr Canyon*: 24 km S, Sierra Vista, 9.V.1964, 1710-1830 m, R.F. Sternitzky, 1F (CNCI); 23.VII.1968, D.E. Bright, 1M, 2F (CNCI); 3060 m, at night, 23.VIII.1970, R.E. Woodruff, 10F (FSCA); canyon floor, 1650 m, 8-9.VIII.1952, H.B. Leech, J.W. Green, 1M, 1F (CASC); canyon mouth, grassland, 1430 m, Locs. 25 & 31, 20 & 24.VII.1976, J.M. Campbell, P.M. Hammond, G.E. Ball, 1F (UASM); E Slope, 1760 m, UV, pine-oak forest, 20.VII.1976, J.M. Campbell, P.M. Hammond, G.E. Ball, 18M 32F (UASM); Copper Canyon, 13.VII.1978, G.J. Hilchie, 1F (GJHC); *Miller Canyon*: 21.VII.1907, H.A. Kaeber, 1M, 2F (USNM); 1530 m, E.R. Hoebeke, (CUIC) — (25.VI.1974, 1F; 1.VII.1974, 1M; 2.VII.1974, 3F; 3.VII.1974, 1M, 2F; 5.VII.1974, 5M, 5F; 7.VII.1974, 3F; 10.VII.1974, 1M, 2F; 17.VII.1974, 1F); 1530 m, T.L. McCabe, (CUIC) — (25.VI.1974, 1M; 2.VII.1974, 2F; 3. VII.1974, 1M; 4.VII.1974, 1F; 8.VII.1974, 1F; 14.VII.1974, 1F; 15.VII.1974, 1F; 17.VII.1974, 1F: 22.VII.1974, 1M); 1680 m, A.E. Zuccaro, Jr. 21.VII.1985, 2M, 3F (PKLC); 30.VI.2000, R. Turnbow, 1F (RHTC); *Ramsey Canyon*: R.F. Sternitzky (CNCI) — (1830 m, 2.VIII.1964, 1F; 1830 m, 29.VI.1967, 1F; 11.VII.1967, 2F; 16.VII.1967, 1M; 22.VII.1967, 2M; 24.VII.1967, 1F; 1590 m, IV-V.1968, 2F; 1830 m, 27.V.1968, 2F; 1590 m, VI.1968; 1590 m, VII.1968, 2M, 1F; VIII.1968, 2M, 1F; 1590 m, VIII.1968, 2M, 3F; IX.1968, 1M); Sierra Vista, Huachuca Mountains, R.F. Sternitzky (CNCI) — (20.III.1964, 1F; V.1965, 1F; VI, 1965, 1F; 15-30.VI.1965, 1M; VI.1966, 1F; 16.VI.1967, 2M, 8F; 20.VI.1967, 1M, 2F; 8.VII.1967, 2F; 20-31. VII.1967, 5M, 3F; 25.VII.1967, 7M, 7F; IX.1967, 2M, 3F; X.1967, 3M, 7F); Sunnyside, 19.VIII.1940, Van Dyke, 1F (CASC); *Peloncillo Mountains*, 52.8 km E. Douglas, at light, 17.VII.1973, S. McCleve, 3M (UAIC). *Coconino County*: Walnut Canyon, 10.1 km EESE Flagstaff, 12. VII.1965, J.G. Franclemont, 1M (CUIC). *Gila County*: Globe, 18.VII.1933, Parker, 1M (CASC); 17.6 km SE, Globe, Pinal Mtn. Recreation Area, 27.VII.1990, P.K. & E.B. Lago, 1F (PKLC); 24.1 km E, Payson, 1640 m, Loc. 37, 26.VII.1976, G.E. Ball, J.M. Campbell, P.M. Hammond 1M, 1F (UASM); Pinal Mts., 1707 m, UV, 13-15.VII.1977, R.P. Allen, G.C. Duffy, 20M, 16F (CDAE). *Graham County*: Aravaipa Canyon, east end, at light, 24-25. VII.1974, S. McCleve 1F (UAIC); Aravaipa Canyon, 17.7 km N, Klondyke Junction, Turkey Creek, 900 m, Loc. 33, UV, 24.VII.1976, G.E. Ball, J.M. Campbell, P.M. Hammond, 3M 1F (UASM); Fort Grant, 12.VII, Coll. Hubbard, Schwarz, 1F (USNM); *Galiuro Mountains*, "Galiuro Mountains", 1650-1770 m, 30.VII.1963, G.E. & K.E. Ball, 1F (UASM); Ash Creek Canyon, North Fork, 1530-1640 m, riparian forest, 82-18, 16-17.VIII.1982, G.E. Ball, S. McCleve, D.R. Maddison, 1M, 7F (UASM); Powers Garden, 28.VII.1963, G.E. & K.E. Ball, 1F (UASM); *Pinaleño Mountains*, 9 km SW, of Artesia, Wet Canyon, Arcadia Camp, 2030 m, 5-7.VIII.1991, M. Damon, R. Davidson, M. Klingler, W. Zanol, J. Rawlins, 2M (CNMH); [*Pinaleño Mountains*], Mt. Graham, Wet Canyon, 15 km SW Safford, 1800 m, ex f.i.t., S&JP 2000-11, 6.V-6. VI.2000, S. & J. Peck, 2F (CMNC). *Greenlee County*: 33.6 km N, Clifton, 12.VII.1968, D.E. Bright, 1M (CNCI). *Pima County*: (non-montane localities), Green Valley, VI.1973, Lenczy, 4M, (OSUC); Madera Canyon, 5.VIII.1961, F.G. Andrews, 1M (CDAE); Madera Canyon, at light, 8. VIII.1986, M.A. Ivie, 1M (MTEC); Madera Canyon, Proctor Road, MV + UV, 25.VII.1989, R.H. Turnbow, 2F (RHTC); Mount Lemmon, lower edge of oak zone, 14.

VIII.1983, E.G. Riley, 1F (TAMU); Santa Rita Experimental Range, 4.VIII.1988, S. Lajeunesse, 1M (MTEC); Tucson, J.W. Green, 1M (CASC); *Baboquivari Mountain,* Baboquivari Canyon, 25-27.VII.1952, H.B. Leech, J.W. Green, 6M, 1F (CASC); El Mirador Ranch, 6.4 km NW, of Sasabe, 1190 m, 3.IX.1950, T. Cohn, P. Boone, M. Cazier, 1M (AMNH); Kitt Peak, 2.VIII.1968, D.E. Bright, 8M, 10F (CNCI); Sabino Canyon, 1143 m, at light, 31.VII.1979, S. McCleve, 1M (UAIC); 20.8 km E, Topawa, 1220 m, 25. VII.1952, Leech, Green, 1F (CNCI); *Santa Catalina Mountains*, Bear Canyon, 2140 m, Acc. No. 48-123, 4-5. VIII.1948, G.E. Ball, 1F (UASM); Bear Canyon area, Lot. No. 387, 2.VII.1959, R.H. Arnett, Jr., 2F (FSCA); Bear Canyon, Lot. No. 395, 6.VII.1959, R.H. Arnett, Jr., 1F (FSCA); Madera Canyon, UV, 26.VIII.1970, R.E. Woodruff, 2F (FSCA); Madera Canyon, 15.VIII.1983, E.G. Riley, 1F (TAMU); Madera Canyon, Whitehouse Picnic Area, MV & UV, 24.VII.1989, R. Turnbow, 1M, 1F (RHTC); Molino Basin, 2.VIII.1970, J. Powell, P. Rude, 1F (EMEC); Molino Basin, 1410 m, 3.IX.1965, L. & C.W. O'Brien, 3M, 4F (USNM); Molino Basin, 1410 m, 4. IX.1965, L. & C.W. O'Brien, 1F (USNM); Molino Canyon, 9.IX.1969, 1M (UASM); *Santa Rita Mountains*, 11.VII.1986, J.A. Comstock, 1M (CNCI); Box Canyon, 1340 m, 3.VIII.1988, S. Lajeunesse, 2M (MTEC). *Pinal County*: Casa Grande, 12.VIII.1955, 1F (UCRC). *Santa Cruz* County: (non-montane localities), Canelo, 14.V.1967, R.F. Sternitzky, 1M (CNCI); Patagonia, Sonoita Creek, 14.IV.1968, R.F. Sternitzky, 1F (CNCI); *Atasco Mountains,* Sycamore Canyon, UV, 13.VIII.1977, S. Kaba, 2M, 6F (CDAE); *Pajarito Mountains*, Peña Blanca, 31.VIII.1966, F.G. Andrews, 1F (CDAE); Peña Blanca, 1210 m, 26. VIII.1959, J.G. Franclemont, 2F (CUIC); Peña Blanca, 1190 m, at light, 5.VIII.1979, J.K. Liebherr, 1F (CUIC); Peña Blanca, Lot 600, R.H. Arnett, Jr., E. van Tassell, (FSCA) — (6.VII.1962, 1M; 7.VII.1962, 1M; 9.VII.1962, 1M, 1F; 14.VII.1962, 1M; 16.VII.1962, 1M); Peña Blanca, 1220 m, at light, 11.VIII.1960, G.E. Ball family, R.B. Madge, 1F (UASM); 29.VII.1965, G.E. Ball, D.R. Whitehead, 2M, 1F (UASM); Peña Blanca, Lot No. 172, 8-10 PM, UV, J. Stibick, 22.VII.1964, 1F (USNM); Peña Blanca, Lot No. 185, UV, J. Stibick, 8.VIII.1964, 1F (USNM); Peña Blanca Canyon, 28.VII.1970, K.P. Stephan, 1F (TAMU); Peña Blanca Lake, 20.VII.1985, P.K. Lago, 2M, 7F (PKLC); 3.2 km S Peña Blanca Lake, UV light, 1250 m, 28.VII.1989. R.S. Anderson, S. McCleve, 5F (TAMU); near Peña Blanca Lake, 31° 22' 58"N 111° 05' 30"W, 7.VIII.2003, E.G. Riley, 1M, 3F (TAMU); *Patagonia Mountains*, Mt. Washington, 1830 m, nr. Nogales, 16. VII.1919, J.A. Kusche, 1F (CASC); Mt. Washington, 1830 m, nr. Nogales, 20.VII.1919, J.A. Kusche, 3F (CASC); *Santa Rita Mountains*, Santa Rita Mountains, 15.VI, Hubbard, Schwarz, 1F (USNM); Box Canyon, 7.IV.1968, K.P. Stephan, 1M (TAMU); Box Canyon, 13.IV.1969, K.P. Stephan, 1F (TAMU); Madera Canyon, 25-29.VII.1982, J.E. Wappes, 2F (TAMU); Madera Canyon, 8.VIII.1970, A.J. Gilbert, 1F (CDAE); Madera Canyon, 1890 m, 1-2. VIII.1952, H.B. Leech, J.W. Green, 1M (CASC); Madera Canyon, J.G. Franclemont, (CUIC) — (1490 m, 30. VI.1959, 7M, 8F; 1490 m, 1.VII.1959, 1490 m, 8M, 7F; 1490 m, 2.VII.1959, 1M, 1F; 1490 m, 4.VII.1959, 3M, 10F; 1490 m, 8.VII.1959, 1M; 1490 m, 20.VII.1959, 4M, 4F; 1490 m, 23.VII.1959, 3M, 2F; 1490 m, 25.VII.1959, 3M, 1F); Madera Canyon, J.D. Marshall (CUIC) — (1490 m, 10.VI.1963, 1M; 1490 m, 11.VI.1963, 1M; 1710 m, 15.VI.1963, 1M; 1710 m, 17.VI.1963, 3M, 2F; 1710 m, 18.VI.1963, 2M, 1F; 1710 m 20.VI.1963, 1M; 1490 m, 23.VI.1963, 1F; 1710 m, 25.VI.1963, 1M; 1710 m, 28. VI.1963, 1F; 1710 m, 1.VII.1963, 1M; 1490 m, 4.VII.1963, 1F); Madera Canyon, 1340 m, 13.VI.1965, R.W. Poole, 1M (CUIC); Madera Canyon, 13.VIII.1968, light trap, E.C. Becker, 1M, 4F (CNCI); Lot No. 436, 5.VIII.1959, R.H. Arnett, Jr., 11M, 4F (FSCA); Madera Canyon, at light, 17.VII.1959, G.E. Ball family, 4M, 5F (UASM); Madera Canyon, 1530-1770 m, 3.VIII.1960, G.E. Ball family, R.B. Madge, 1M, 3F (UASM); Madera Canyon, 1530-1770 m, 10.VIII.1960, G.E. Ball family, R.B. Madge, 8M, 6F (UASM); Madera Canyon, 1520 m, under oak leaves, 10. VIII.1960, G.E. Ball family, R.B. Madge, 2F (UASM); Madera Canyon, 1530 m, at light, 11-24.VIII.1963, G.E. & K.E. Ball, 1M, 6F (UASM); Madera Canyon, 1895 m, 1-2. VIII.1952, H.B. Leech, J.W. Green, 1F (CASC); Madera Canyon, UV, 15.VIII.1964, R. Dickson, 1M (UCRC); Madera Canyon, 15.VII.1947, L. Martin, 1F (LACM); Madera Canyon, 1710 m, 17.VI.1963, J.D. Marshall, 1M (CUIC); Madera Canyon, 1710 m, 21.VI.1963, J.D. Marshall, 1M (CUIC); Madera Canyon, 10.VIII.1957, Stange, Harding, 1M (LACM); Madera Canyon, 21.VII.1969, K.P. Stephan, 1F (TAMU); Madera Canyon, 8.VII.1970, K.P. Stephan, 1F (TAMU); Madera Canyon, W. Rosenberg, (USNM) — (1.VII.1977, 2F; 2.VII.1977, 1F; 3.VII.1977, 4F; 4.VII.1977, 1M, 1F; 5.VII.1977, 3F; 6. VII.1977, 1F; 7.VII.1977, 1M; 9.VII.1977, 1M; 12. VII.1977, 2M, 1F; 13.VII.1977, 1M, 2F; 14.VII.1977, 1F); Madera Canyon, 1650 m, UV, 7-8.VIII.1986, M.A. Ivie, 2M, 2F (MTEC); Madera Canyon, 1650 m, UV, 4.VIII.1988, M.A. Ivie, 1F (MTEC); Madera Canyon, 1400-1670 m, 13-22.VI.2011, J. Wappes, B. King, 1M, 2F (UASM); Madera Canyon, Bog Spring Camp Ground, 10-26.VIII.1964, D. Davis, 2M, 7F (USNM); Madera Canyon, Roundup Picnic Area, MV + UV, 27.VII.1989, R.H. Turnbow, 1M, 1F (RHTC); *Tumacacori Mountains*, Calabasas Canyon, E slope, 1220 m, chaparral, 28.VII.1948, G.E. Ball, H.E. Evans, 1F (UASM). *Yavapai County*: Granite Basin Lake, 11.2 km NW, Prescott, 17.VII.1985, P.K. Lago, 3M 4F (PKLC); Prescott, 6.4 km N, Granite Dells, 12.VII.1970, L.M. Martin, 1F (LACM); Prescott, UV, 1.VIII.1968, J.C. Schaffner, 1F (TAMU). **New Mexico:** *Catron County*: Cooney Canyon, 16 km E, Alma, 11.VII.1959, G.E. Ball family, 1F (UASM). *Grant County*: Burro Mountains, Sawmill Canyon, 1840 m, UV, 19.VII.1983, S. McCleve, W. Riley, 2M (UASM). *Hidalgo County*: Peloncillo Mountains, Clanton Draw, at light, 1675 m, 7.VII.1991, S. McCleve, 1F (TAMU). *Otero County*: Sacramento Mountains, Westside Road, 32° 54' 49"N 105° 50' 05"W, UV, 2285 m, 11.VII.2003, E.G. Riley, 3M, 3F (TAMU). *Socorro County*: Water Canyon 11 km SE, Magdalena, 2070 m, 5.VIII.1984, R.E. Acciavatti, R.L. Davidson, 2F (CMNH). **Texas:** *Brewster County*: *Big Bend National Park*, Cattail Falls Road and Window Outlet, R.S. Anderson, 1M (UASM). Bigbend National Park, 14.VII.1950, R.F. Smith 1M, 2F (AMNH); Big Bend National Park, 9. IV.1967, A. & M.E. Blanchard, 1M (USNM); Chisos Basin, 17.VI.1956, H. & A. Howden, 2F (CNCI); Chisos Basin, H.F. Howden, E.C. Becker (CNCI) — (beating *Quercus grisea* or *Juniperus* or taken at light, 3.V.1959, 3M, 2F;

beating *Quercus grisea*, 8.V.1959, 1M 2F; 27.V.1959, 2M, 1F); Chisos Basin, door light, 1610 m, 19.V.1982, R.O. Kendall, C.A. Kendall, 1F (TAMU); Green Gulch, 2. VII.1978, J.E. Wappes, 2M (JEWC), 1F (TAMU); Green Gulch, 5.IV.1967, A. Blanchard, 2M (USNM); Juniper Canyon, 14.VII.1928, F.M. Gaige, 1F (AMNH); North Rosillos Mountains, Butrill Spring, Malaise trap, 10-17. VII.1991, R. Vogtsberger, 1M, 3F (TAMU): Panther Junction, 1220 m, 29-30.IV.1959, H.F. Howden, E.C. Becker, 1F (CNCI); Panther Pass, 1780 m, UV, 21.VII.1967, R.G. Beard, 1F (CUIC). *Jeff Davis County*: Limpia Canyon, Fort Davis, 4-6.VII.1968, J.E. Wappes, 1F (JEWC); Lympia [*sic!*] Canyon, Fort Davis, 4-6.VII.1978, J.E. Wappes, 1F (TAMU); 3.2 km N, Fort Davis, 26.VII.1985, A.E. Zuccaro, Jr., 1F (PKLC); 1.6 km W, Fort Davis, UV, 20.VII.1968, J.E. Hafernik, 1M, 1F (TAMU); Indian Lodge State Park, Route 118, UV, late evening, Lot No. 132, 8.VII.1964, J. Stibick, 2F (USNM); Route 118, 32-35.2 km SE, Kent, mesquite, 15.VIII.1981, R.L. Davidson, 1F (CMNH); Mount Locke, Davis Mountains, 4.VII.1969, A. & M.E. Blanchard, 18M, 13F (USNM); Davis Mountains Resort, 1830 m, 15.VII.1999, J.E. Wappes, 1M (TAMU); Davis Mountains Resort, MV & BL, R. Turnbow, (RHTC) (25. VI.2000, 2M, 1F; 26.VI.2000, 2M; 1.VII.2000, 2M, 1F); Davis Mountains Resort, 1700 m, 2-3.VII.2000, J.E. Wappes, 2F (TAMU); Davis Mountains Resort, D. Marqua residence, UV light, 1765 m, 26.VI.1994, E.G. Riley, 3M, 1F (TAMU); Davis Mountains Resort, D. Marqua residence, UV light, 1.VII.1999, E.G. Riley, 4M, 2F (TAMU); Davis Mountains Resort, upper Limpia Creek Canyon, 30º 37' 48"N 104º 07' 59"W, UV, 1880 m, 17.VII.2002, C.M. & E.G. Riley, 1M, 5F (TAMU); rest stop 15.2 km S Junction Hwy 118 on 166, UV light, 24.VII.1989, E.G. Riley, 1M (TAMU); rest stop 15.2 km S Junction Hwy 118 on 166, UV light, 9.VIII.1992, W. Godwin, E.G. Riley, 2F (TAMU); Davis Mountains State Park, UV, 29-30.VI.1999, E.G. Riley, 1M (TAMU); Madera Canyon Rest Stop, Hwy. 118, 23.VII.1989, E.G. Riley, C. Wolfe, 1F (TAMU); Madera Canyon Rest Stop, Hwy. 118, UV light, 28.VII.1999, E.G. Riley, 2F (TAMU). *Webb County*: Laredo, 8.I.1936, on green string beans, from México, 3791 R.C. Bondy, 1F (USNM); Laredo, 27.I.1938, on string beans, from México, 38-1597, R.C. Bondy, 1F (USNM).

Cymindis (*Pinacodera*) *punctifera toltec*, Hilchie & Ball, new subspecies

(Figs. 5B, 7B, 7C, 9B, 9C, 11C-E, 13A, 20 22, 23, 30, 31)
http://zoobank.org/A9EEBEEF-3E36-4701-B9DD-84A030338623

Pinacodera cribrata (in part); Bates 1883: 188.

Note about synonymy. Bates (1883: 188) recorded two groups of localities for this taxon: a northern group, including sites in Veracruz and Oaxaca, México, and a southern group, including sites in Guatemala. Specimens from the Mexican sites probably belong to *C. punctifera toltec,* whereas those from the southern sites probably belong to *C. zacapa*, new species.

Type material. HOLOTYPE: Male: "// MEX. Sinaloa, Rte. / 15, Microond. El / Indio, Sin. thorn / for. 370 m, u.v light / 93-30, 18.VII.93 // MEX. EXPEDITION / 1993 S. McCleve, / G.E. & K.E. Ball / collectors //" (USNM). PARATYPES, 252 specimens: **MÉXICO. Colima:** 9.7 km S, Colima, 335 m, Acacia thorn scrub, 88-24, 4.VII.1988, R.S. Anderson, 1M, 1F (UASM); 15.8 km S Colima, Rte 110, 500 m, pasture, oak-acacia litter, 31-85, 5.VIII.1985, H.E. Frania, D. Shpeley, 1F (UASM). **Durango:** Canelas, 1M (ZMHB); 16 km W, Durango, 12.VII.1954, J. W. MacSwain, 1F (EMEC); 25.6 km S, Durango, 14.VII.1964, H.F. Howden, 2F (CNCI); 40 km W, Durango, 10.VI.1964, H.F. Howden, 3M, 1F (CNCI); 44 km SE, Durango, 2.X.1990, R.H. Turnbow, 1M (RHTC); El Salto, San Antonio, 1530 m, 10.VI.1937, M.A. Embury, 1F (CASC); 51.9 km S Durango City, road to La Flor, Rte. 115, UV light, 93-44, 2560 m, 27.VII.1993, S. McCleve, G.E. & K.E. Ball, 1F (UASM); 11.8 km N, El Pino, oak-pine grassland, 2270 m, 93-39, 25-26.VII.1993, S. McCleve, G.E. & K.E. Ball, 1F (UASM); 11.8 km N, El Pino, oak-pine grassland, 2270 m, UV light, 93-40, 25-26.VII.1993, S. McCleve, G.E. & K.E. Ball, 2F (UASM); El Salto, vicinity, V.1976, pitfall, E. van den Burghe, and J. Probst, 2F (CMNH); Reserva de la Biosfera, La Michilia, El Temazcal, pine-oak forest, 2400 m, 80-22, 11-14.VIII.1980, 1980, G.E. Ball, W. Fraga, D. Shpeley, 1F (UASM); 8 km N, Rodeo, 6.4 km W, ca. UV light, 1417 m, 15.VII.1984, S. McCleve, P. Jump, 3M, 6F (UASM). **Guerrero:** 78.5 km N, jct. Rte. 200 on Rte. 134 to Ciudad Altamirano, oak-pine forest, leaf litter & under logs, 1770 m, 31-92, 31.VII.1992, J.S. Ashe, H.E. Frania, D. Shpeley, 1M (UASM); 22 km E, Cacahuamilpa, 1100 m, [no date], 3M, 1F (USNM); 22 km E, Chichihualco, 1590 m, 22.IX.1989, R. Turnbow, 1M (RHTC); 8 km N, Chilpancingo, 24.VIII.1958, H. F. Howden, 1M, 1F (CNCI); 8-10 km E, Huitzuco, 19. IX.1989, R. Turnbow, 2M, 1F (RHTC); 15.4 km SW, jct. Rte. 196 and rd. to Filo de Caballos, 1350 m, tropical deciduous forest, UV, 83-73, 9.VIII.1983, H.E. Frania, R.J. Jaagumagi, 1F (UASM); microondas, 10.7 km N, Iguala, 1160-1310 m, 21.IX.1989, R. Turnbow, 1M (RHTC); 12.8 km N, Iguala, 21.VIII. 1958, H.F. Howden, 1M, 1F (CNCI); 32 km W, Iguala, 1350 m, at light, 15.IX.1982, J.A. Powell, J.A. Chemsak, 3M, 2F (EMEC); Mexcala, 29.VI.1951, P.D. Hurd, 1F (CASC); 13 km S, Mezcala, (Hwy 95), 17. VII.1992, C.L. Bellamy 1M (CMNH); 9.7 km NE Taxco, 1707 m, 14.VIII.1974, C.W. & L. O'Brien, B. Marshall, 1F (UASM); 16 km NE, Taxco, 1710 m, 8.VII.59, 1F (OSUC); 10 km WSW, Xochipala, 1650 m, 30.VI.1982, J. E. Rawlins, 1M (CMNH); ca. 10 km SW, Xochipala, ca. 1728 m, 6. VII.1987, P. Kovarik, & J. Schaffner, 1F (CUIC); 11.1 km W, Xochipala, 17.IX.1989, R. Turnbow, 1F (TAMU). **Hidalgo:** 20.9 km NW, Ixmikilpan, on Rte. 85, 1.3 km SE, 1524 m, UV light, 14.VII.1986, S. McCleve & P. Jump, 2F (UASM). **Jalisco:** 11.7 km S, Cocula, 1814 m, UV light, 12.VII.1984, S. McCleve, P. Jump, 1F (UASM); 8.8 km NW, Cuautla [*sic*!] 2020 m, 6-7.VIII.1967, G.E. Ball, T.L. Erwin, R.E. Leech, 2M, 1F (UASM); 14.6 km NW, Cuautla, 1675 m, 7.VIII.1967, G.E. Ball, T.L. Erwin, R.E. Leech, 2F (USAM); 42.4 km NW Cuautla, 1760 m, pine-oak litter, 28-85, 3.VIII.1985, H.E. Frania & D. Shpeley, 2M (UASM); 47 km NW Cuautla, 1520 m, arroyo, oak-acacia, 27-85, 2. VIII.1985, H.E. Frania, D. Shpeley, 1F (UASM); 7 km N, Malacque [*sic*!], 16, 19.VII.1990, J.E. Wappes, 1F (JEWC); 5.3 km S Tequila, on road to microondas, 1560 m, oak forest litter, 25.VII.1985, H.E. Frania & D. Shpeley, 1F (UASM). **México** (state)**:** Cerros Guadalupe, 7.VII.1962, U. Stein, Col. J. Hendrichs S., 1F (CNIN). **Michoacán:** 35.4 km N, Arteaga, oak-Acacia woodland, 914 m, 8-17,

31.VII.1988, R.S. Anderson, 1F (UASM); San Lucas, Cerro del Salguaro, 300 m, 18º24'40"N, 100º38'00"W, selva baja caducifolia, vegetacion secundaria arbustiva, col. noche, 18.IX.2004, P. Feria *et al.*, 2F (USNM); km 23, Carretera Morelia-Patzquaro, 2000 m., 26.V.1988, A. Cadena, L. Cervantes, 1F (CNIN); 14.3 km S, Uruapan, oak-Acacia woodland, 1370-1465 m, 88-10, 29.VII.1988, R.S. Anderson, 1F (UASM). **Morelos:** Cuernavaca, 1680 m, 17.V.1959, H.E. Evans, 1M (CUIC); Cuernavaca, 1680 m, 28.V.1959, 1M; Cuernavaca, 1680 m, 4.VI.1959, H.E.& M.A. Evans, 1M (CUIC); Cuernavaca, 1680 m, 6.VI.1959, H.E.& M.A. Evans, 1M; Cuernavaca, Dr. A. Fenyes, A. Fenyes Collection, 1M, 1F (CASC); Cuernavaca, June, A. Fenyes Collection, 1M (CASC); Cuernavaca, 29.IX.1964, E.G. Linsley, A.E. Michelbacher, 1M (EMEC); Cuernavaca, 13.IX.1902, F. A. Eddy collection, 1M (MCZC); 8 km N, Cuernavaca, 28.VIII.1958, H.F. Howden, 1F (CNCI); 14.6 km E, Cuernavaca, Cañon de Lobos, 1310 m, UV, 24. VII.1966, G.E. Ball, D.R. Whitehead, 1F (UASM); 16 km E, Cuernavaca, 31.VII.1963, J. Doyen, 1F (EMEC); 24.1 km S, Cuernavaca, 15.XI.1946, E.C. Van Dyke, 1F (CASC); Huitzilac, 24.XI.1963, Col. J. Hendrichs S., 1F (CNIN); Tepalcingo, Los Sauces, 1004 m, 18º35'10"N, 98º57'18"W, selva baja caducifolia, vegetación secundaria arbustiva, trampa, 20-21.VI.2004, P. Feria *et al.*, 7F (UASM). Tlaquiltenango, Lorenzo Vsquez, 900 m, 18º33'36"N, 99º04'01"W, selva baja caducifolia, vegetación secundaria arbustiva, col. noche, 19.VI.2004, P. Feria *et al.*, 1M, 3F (USNM); Tlaltizapán, 1F (ZMHB); Xochitepec, *Atta* sp. 14.IV.1965, Col. J. Hendrichs S., 1M (CNIN). **Nayarit:** Arroyo Santiago, nr. Jesús María, 5.VII.1955, B. Malkin, 1M (EMEC); Rte. 66, 12.1 km E Jalcocotan, subtropical fruitfall in ravine, 963 m, 86-97, 25.VIII.1986, G.E. Ball, H.E. Frania, & D.J. Mulyk, 1F (UASM); 57.9 km SW Las Piedras, ca. 70 m, UV light, 7-8.VII.1984, S. McCleve, P. Jump, 9M, 8F (UASM); Nayarit-Durango border, 110.3 km W Huejuqillo el Alto (Jal.), road to Jesús María (Nay.), pine-oak forest litter, 2300 m, 21-85, 30.VII.1985, H.E. Frania & D. Shpeley, 1M, 2F (UASM); 2 km E, Punta de Mita, 30.VII-2.VIII.1991, C.L. Bellamy, 1F (CMNH); San Francisco, 17.X.1989, A. Cadena, 1F (CNIN); San Leonel, 9.6 km S, 17.III.1985, L. Strange, R. Miller, 1M (FSCA); 37 km. SE Tepic, ca. 1295 m, UV light, 5.VII.1985, S. McCleve, P. Jump, 1M, 2F (UASM); 33 km SE Tepic, Rte. 15, UV light, oak-pine forest, 1270 m, 93-32, 20-21. VII.1993, S. McCleve, G.E. & K.E. Ball, 3M, 5F (UASM); Volcan Ceboruco, Isla, UV light, 15-16.VII.1993, Morris, Huether, Wappes, 2F (RFMC). **Oaxaca:** 4.3 km E, Azumbilla, 2170 m, thorn scrub, 10.VII.1975, G.E. Ball, H.E. Frania, 1F (UASM); Chacalapa, 14.X.1985, Y. Mariño, 1M (CNIN); 8 km W, El Camaron, 20.V.1969, H.F. Howden, 1M, 3F (UASM); 9.7 km N, Huajuapan de Leon microondas, 2 km W, Rte. 90, oak-acacia, 2000 m, 79-25, 9.VI.1979, J.S. Ashe, G.E. Ball, D. Shpeley, 1 M (UASM); 14.3 km E, Ixtlán de Juárez, dry pine forest, 2030 m 21.VII.1975, G.E. Ball, H.E. Frania, 1F (UASM); 8.8 km SW, Laguna Guadalupe, Rte. 125, under bark, leaf litter, 2050 m, 92-60, 18.VIII.1992, J.S. Ashe, H.E. Frania, D. Shpeley, 1M (UASM); 12.8 km N, La Ventosa, 20.VII.1968, J. Doyen, 2M, 2F (EMEC); 13-14 km E Mitla, 2100 m, 11.VIII.1986, H. & A. Howden, 2F (UASM); 14 km E, Mitla, (road to Zacotepec), 2150 m, 17.VIII.1988, J.K. Liebherr, D.A.Yager, 1M, 1F (CUIC); Monte Alban, 27.III.1990, E. Barrera, A. Cadena, 1M (CNIN); Oaxaca [Ciudad], 1530 m, 20.VII.1937, M.A. Embury, Van Dyke Collection, 5M, 6F (CASC); 4.8 km SE, Nochixtlan, at night, O'Brien & Marshall, 2103 m, 1F (UASM); 17.6 km. SE Nochixtlán, at night, 2220 m, 1.VI.1974, C.W. & L. O'Brien, & B. Marshall, 1M (UASM); 35.8 km N, Puerto Escondido, 640 m, UV, 20-21.VII.1966, G.E. Ball, D.R. Whitehead, 1F (UASM); 43 km W, Salina Cruz, 91 m, Acacia thorn scrub, 87-19, 14.VII.1987, R.S. Anderson, 2F (UASM); 43.2 km SW Salina Cruz, 14.VII.1987, Kovarik, Schaffner, 1F (TAMU); Sola de Vega, km 41, Puerto Escondido Road, 4.VII.1990, E. Barrera, A. Cadena, 1M (CNIN); Tehuantepec, 26.V.1951, L. Vásquez, 1F (CNIN). **Puebla:** 7.1 km E Azumbilla. pine-juniper-yucca woodland, 2220 m, 92-71, 22.VIII.1992, G.E. Ball, H.E. Frania, 1F (UASM); 7 km SW Chipilo, 1990 m, cult. oak, arroyo, 54-85, 16.VIII.1985, H.E. Frania & D. Shpeley, 1M (UASM); Tehuacán, Hoege, donated by F. du C. Godman 1907, Am. Mus. Nat. Hist. Dept. Invert. Zool., No. 65, 2F (AMNH); Tehuacán, Hoege, 1M (ZMHB); Teotlalco, Cerro La Peña del Cuervo, Tlaucingo, 1004 m, 18º23'31"N, 98º 49'20"W, selva baja caducifolia, col. noche, 16.VIII.2004, P. Feria *et al.*, 1M (USNM); Teotlalco, Cerro La Peña del Cuervo, Tlaucingo, 1004 m, 18º23'31"N, 98º 49'20"W, selva baja caducifolia, col. noche, 17.VIII.2004, P. Feria *et al.*, 1M, 1F (USNM). **Sinaloa:** 8 km NW Choix, 11.VII.1968, T.A. Sears, 7M, 10F (CASC); 24.1 km NW Culiacan, 6.4 km N on rd. to Presa L. Mateos, ca. 195 m, UV light, 3.VII.1984, S. McCleve & P. Jump, 4M, 2F (UASM); 35.2 km S, Culiacán, 5.VIII.1981, P. Jump, 1M (UAIC); 14 km NE, La Cap de Taxte, 30.IX.1990, J.E. Wappes, 1F (JEWC); Mazatlán, 16.I.1930, Blackwelder Collection, 1M (USNM); Mazatlán, 17-23.VII.1963, P.J. Spangler, 1F (USNM); 8 km N, Mazatlán — (5-7.VIII.1964, H.F. Howden, 5M, 6F (CNCI); 24.VII.1964, H.F. Howden, 1F (CNCI); 24-29. VII.1964, H.F. Howden, 1F (CNCI); 28.VII.1964, H.F. Howden, 1F (CNCI); 30.VII.1964, W.C. McGuffin, 1M, 1F (CNCI); 1.VII.1965, J.A. & M.A. Chemsak, E.G. & J.M Linsley, 1M, 1F (EMEC); at light, 28.VII.1973, J.A. Chemsak, 1M, 3F (EMEC); at light, 25.VII.1973, J.A. Chemsak, E.G. Linsley, A.E. Michelbacher, 2M, 1F (EMEC); 48 km N, Mazatlán, microondas [sic!] El Indio, 412 m, trop. deciduous forest, UV light, 6.VIII.1986, G.E. Ball, H.E. Frania, & D.J. Mulyk, 2M, 2F (UASM); 87 km E Mazatlán, Rte. 40, 1090 m, arroyo, litter in oak forest, H.E. Frania, R.G. Jaagumagi, D. Shpeley, 1M (UASM); 33.6 km E, Villa Union, 25.VII.1964, H.F. Howden, 1M (CNCI); Rte. 15, Microondas El Indio, Sinaloan thorn forest, UV light, 370 m, 93-30, 18.VII.1993, S. McCleve, G.E. & K.E. Ball, 2M, 3F (UASM). **Veracruz:** (labeled Ex. Musaeo Chaudoir) Bates, 1M, 2F (MNHP). **Zacatecas:** Hacienda Laguna Balderrama, 40 km W, of Fresnillo, 2410 m, 21-25. VI.1954, R.H. Brewer, 1M (FMNH).

Subspecific epithet. An aboriginal word, used as a Latin nominative singular noun in apposition. The Toltec were one of the indigenous peoples of México; this taxon is named in their honor. Toltec were purported to have existed from about 890-1100 CE. The peoples appear to have been absorbed into the Aztec culture and were often referred to as wise men or women and took on mythical proportions by the Aztec.

Type locality. Rte. 15, Microondas El Indio, Sinaloa, México.

Recognition. Generally similar to *C. p. punctifera*, most males of *C. p. toltec* lack the knob-like phallic apex (Figs. 11C-E) exhibited by males of the nominotypical subspecies (Figs. 11A-B). Further, *Cymindis p. toltec* specimens average larger in size (males 7.70 mm, females 7.99 mm) than those of *C. p. punctifera* (males 7.30 mm, females 7.49 mm) (Table 2). Pronotal proportions (PL/PW, Table 3) match those of *C. p. punctifera.*

Form of the phallic preapex ranges from near *C. p. punctifera* to near *C. latiuscula*. Adults appear to be intermediate in size between those two taxa (SBL, Table 2), and vary in extent of punctation on the vertex, from near *C. p. punctifera* to near typical *C. latiuscula.*

Description. Size, form, microsculpture and color average as per *C. p. punctifera*. Data on variation in SBL, the ratio PL/PW, and in phallic measurements (MLp, MWp, MDp, and DPp), are presented in Tables 2 to 7.

Punctation and vestiture. Head similar to *C. p. punctifera,* vertex (Figs. 5B, 7B, 7C) with slightly shorter setae, punctures irregular and shallower; frons with few punctures, anteriolateral sculpture not expanded.

Thorax. Pronotum. Normal for *latiuscula* species subgroup (Figs. 9B, 9C).

Elytra. Normal for *latiuscula* species subgroup, apex rounded.

Male genitalia. Phallus (Figs. 11C–11E) short (Table 4), narrow (Table 5), curvature slight (Table 6), and preapex moderately long (Table 7), with or without a terminal bulb. Endophallus (Fig. 11E) without dense microtrichial patches.

Female genitalia (Fig. 13A). Ovipositor gonocoxites are virtually indistinguishable from *C. p. punctifera* (Fig 12F). See discussion under *C. p. punctifera*.

Variation and comparisons. Throughout most of its range, adults of this subspecies show little variation. In Jalisco, Guerrero, and Oaxaca the ranges of *C. latiuscula* and *C. p. toltec* overlap. Punctation on the vertex varies from near typical *C. p. punctifera* (Figs. 5A, 7A) through individuals with fewer punctures on the vertex (Figs. 5B, 7B, 7C), as typical for *C. latiuscula*. Males have phallic form ranging from near typical *C. p. punctifera* to the tip thickened and atypical (Figs. 11C, 11D, 11E). Externally, these southern males are similar in appearance to those of *C. latiuscula,* except for their much narrower pronotum (Table 3), Figure 23 shows the variation of pronotal shape (expressed through the ratio PL/PW) over their geographic range for *C. punctifera* and *C. latiuscula*. Figure 22 shows a comparison of pronotal length to width ratio versus elevation for *C. latiuscula* and *C. punctifera*. Ecological separation is apparent, with specimens of *C. latiuscula* favoring lower elevations (including southern latitudes) and those of *C. punctifera* capable of living at higher cooler elevations (including northern latitudes).

Habitat, habits and seasonal occurrence. The elevation range for this subspecies extends from near sea level (Mazatlán, Sinaloa) to 2560 m (El Salto, Durango) with a mean elevation of 1467 m (Fig. 23). Collection dates range from February to November with most specimens collected in July and August (Fig. 30). Specimens are found in regions which experience seasonal climatic conditions of extended periods below freezing (may be snow covered) in the winter, and semiarid to arid conditions in the summer. Semi-desert to oak–pine vegetation associations are common sites of collecting for this subspecies (Fig. 21). Data for some specimens indicate tropical deciduous forest, oak–acacia, oak–pine grasslands, pine–juniper–yucca woodland and thorn–oak forest associations. Specimens have been found on the ground in the litter. They fly readily at night, and light capture data represent most of the collections. This subspecies seems not to be associated with bromeliads.

Geographical distribution. (Figs. 20 & 21). The range of this subspecies extends in México from the Isthmus of Tehuantepec northward to northwestern Durango. South of the 20º Meridian, the range extends from the Pacific coast to the western edge of the Atlantic Versant; northward, the range is primarily western—across the Sierra Madre Occidental to the Pacific coast.

Chorological affinities. The geographical range of *C. punctifera toltec* (Fig. 20) overlaps the ranges of eight other species of the *latiuscula* species subgroup, but not the range of more northern *C. p. punctifera* (Fig. 20), *C. apache* (Fig. 14) and *C. yaqui* (Fig. 26), and the more southern *C. zacapa* (Fig. 27).

Morphological affinities. The postulated adelphotaxon of *C. punctifera* toltec is the more northern C. *p. punctifera.*

Cymindis (*Pinacodera*) *rugofrons*, Hilchie & Ball, new species.

(Figs. 2E, 5D, 7D, 9D, 11F, 11G, 13B, 24, 30, 31).
http://zoobank.org/6FEE8D3F-9A15-4E28-B41B-7C2AD006B446

Type material. HOLOTYPE: Male: "// MEX. Jalisco / 12.2 mi. n.w. / Los Volcánes / 5900' / oak-pine forest / August 7, 1967 // Ball, T.L. Erwin / R.E. Leech / collectors //" (USNM). PARATYPES, 9: **MÉXICO. Colima:** Mt. Colima SE, slope, 2.XII.1948, E.S. Ross, 1M (CASC). **Jalisco:** 8.8 km NW, Cautla [*sic*!], 2020 m, 6-7.VIII.1967, G.E. Ball, T.L. Erwin, R.E. Leech, 1M, 1F (UASM); 8.8 km NW Cuautla, oak-pine litter, 1750 m, 24-85, 2.VIII.1985, H.E. Frania, D. Shpeley, 1M, 1F (UASM); 10.6 km NW Cuautla, arroyo, oak-pine litter, 1710 m, 25-85, 2.VIII.1985, H.E. Frania, D. Shpeley, 1M, (UASM); 19.5 km NW, Los Volcanes, 1800 m, oak-pine forest, 7.VII.1967. G.E. Ball, T.L. Erwin, R.E. Leech, 1M (UASM). **Michoacán:** 22.6 km W, Uruapan, 2150 m, wet pine-oak forest, 15.VIII.1967, G.E. Ball, T.L. Erwin, R.E. Leech, 1M (UASM). **Nayarit:** 33 km SE Tepic Rte. 15, oak-pine forest, UV light, 1270 m, 20-21.VII.1993, S. McCleve, G.E. & K.E. Ball, 1F (UASM).

Specific epithet. A Latin-based two-part noun in apposition, singular, nominative case, from the adjective *rugosus* meaning wrinkled and the noun *frons*, meaning that part of the head capsule. The word refers to the markedly irregular dorsal surface of the head capsule (Figs. 5D, 7D).

Type locality. 19.5 km northwest of Los Volcánes, Jalisco, México.

Recognition. The markedly expanded anteriolateral margins and rugosity of the frons, and six setose abdominal sternum VII distinguish members of this species from those of all other members of the *C. latiuscula* species subgroup.

Description. Size and form about average for *latiuscula* species subgroup. Data on variation in SBL, the ratio PL/PW, and in phallic measurements (MLp, MWp, MDp, and

DPp), are presented in Tables 2 to 7.

Punctation and vestiture. Head capsule (Figs. 5D, 7D) with surface rugose: vertex with coarse setose punctures, no glabrous discal area, macrosculpture of anteriolateral margin expanded.

Thorax. Pronotum (Fig. 9D), form average for *latiuscula* species subgroup, surface coarsely punctate.

Elytra. Average for *latiuscula* species subgroup.

Male genitalia. Phallus (Figs. 11F, 11G) long (Table 4), moderately wide (Table 5), curvature moderate (Table 6), preapex relatively short (Table 7), and apex narrowly rounded. Endophallus without dense microtrichial patches.

Female genitalia (Fig. 13B). Ovipositor with gonocoxite 1 average for the subgroup, gonocoxite 2 parallel sided from the base to the point of insertion of the ensiform setae; apex broadly rounded, and scoop shaped. Similar in form to females of *C. huchilobos* (Fig. 12D) and *C. tonatiuh* (Fig. 13C).

Habitat, habits and seasonal occurrence. Specimens of *C. rugofrons* were collected at moderate elevations, 1270 to 2150 m (Fig. 31), in oak pine or wet pine forests. Several specimens were collected in leaf litter and one captured at light. The specimen from Volcan Colima was collected on December 2 from the southeast slope. The remaining specimens were collected in July (n=2) and August (n=5) of which one was teneral.

Geographical distribution. (Fig. 24). The range of this species seems confined to the western part of the Mexican Sierra Transvolcanica.

Geographic affinities. The geographical ranges of *C. crenatoverpa* (Fig. 15), *C. latiuscula* (Fig. 19) and *C. p. toltec* (Fig. 20) are close enough to the range of *C. rugofrons* (Fig. 24) to indicate the possibility of sympatry.

Morphological affinities. Based on the structure of gonocoxite 2 (Fig. 13B), *C. rugofrons* is most closely related to *C huchilobos* (Fig. 12D) and *C. tonatiuh* (Fig. 13C).

Material examined. We have seen 10 specimens of this species. For details, see type material, above.

Cymindis (*Pinacodera*) *tonatiuh,* Hilchie & Ball, new species

(Figs. 2F, 5E, 7E, 9E, 11H, 13C, 25, 30, 31)
http://zoobank.org/B4449CE3-5554-4DA7-A2F4-584899C452E6

Type material. HOLOTYPE: Male, labeled: "// MEXICO. Oaxaca / Rte. 190, 9.4 mi / se. Nochixtlan. / 7200'. / III.24.66 /in bromeliads // George E. Ball / D. R. Whitehead / collectors //" (USNM). PARATYPES: 64, from the following localities: **MÉXICO. Oaxaca:** km 14, Carretera Mitla-Albarradas, 26.III.1990, A. Barrera, E. Cadena, 1F (CNIN); km 108, Huajuapan de Leon, 6.V.1981, E. Barrera, 2M (CNIN); 34.9 km N, Juchatengo, in bromeliads, 2170 m, 18-19.VII.1966, G.E. Ball, D.R. Whitehead, 1M, 3F (UASM); Rte. 190, 15 km SE Nochixtlan, 2200 m, in bromeliads, 24.III.1966, G.E. Ball, D.R. Whitehead, 17M, 14F (UASM); Hwy 131, 184 km S, Oaxaca, 1830 m, 27-30.V.1971, D.E. Bright, 1M (CNCI); Rte 179, 14.2 km S, San Pedro y Pablo Ayutla, 1720 m, oak-pine forest (dry), in litter, 79-41, 18.VI.1979, J.S. Ashe, G.E. Ball, D. Shpeley, 1M (UASM); 14.6 km N, Sola de Vega, in bromeliads, 1860 m, 23.III.1966, G.E. Ball, D.R. Whitehead, 6M, 5F (UASM); Rte. 131, 38.4 km N Telixtlahuaca, [*sic!*] oak-palmetto woodland, leaf litter, 1880 m, 23-92, 19.VII.1992, H.E. Frania, D. Shpeley, 2F (UASM); Rte. 125, 10.8 km N Tlaxiaco, dry oak-pine forest, 2260 m, 17.VIII.1992, 1M, 1F (UASM); 24.2 km SW Yolomécatl, Rte. 125, oak-pine-madrono litter, 2120 m, 20.VIII.1992, G.E. Ball, H.E. Frania, 6M, 3F (UASM).

Specific epithet. An Aztec word used as a Latin nominative singular noun in apposition, the name *Tonatiuh* is that of the Sun God, the image of whose head is shown in the center of the Aztec calendar.

Type locality. Rte. 191, 15 km southeast of Asuncion Nochixtlan, Oaxaca, México.

Recognition. The slightly projected posterior sutural angle of the elytron (Fig. 2F) serves to separate this species from other members of the *C. latiuscula* species subgroup. Punctation of the head capsule of adults of this species resembles that of *C. latiuscula*, except punctures are more numerous and slightly deeper.

Description. Size and form about average for latiuscula species subgroup. Data on variation in SBL, the ratio PL/PW, and in phallic measurements (MLp, MWp, MDp, and DPp), are presented in Tables 2 to 7.

Punctation and vestiture. Head capsule (Figs. 5E, 7E), vertex, 2 to 3 irregular rows of punctures transversing the apex, frons mostly smooth but with scattered setose punctures, anterior lateral sculpture not expanded.

Thorax. Pronotum average for *latiuscula* species subgroup, to slightly narrower (Fig. 9E).

Elytra. Average for *latiuscula* species subgroup, apex angulate (Fig. 2F).

Male Genitalia. Phallus (Fig. 11H) moderately long, slightly less than average for *latiuscula* species subgroup (Table 4), slightly wider than average (Table 5), curvature marked (Table 6), preapex short (Table 7), and apex narrowly rounded.

Female Genitalia (Fig. 13C). Female with gonocoxite 1 average for the subgroup, gonocoxite 2 with sides parallel from base to the insertion point of the ensiform setae; apex broadly rounded and scoop shaped, similar in form to females of *C. huchilobos* (Fig. 12D) and *C. rugofrons* (Fig. 13B).

Habitat, habits and seasonal occurrence. This species occupies primarily dry oak-pine forest, although a few specimens were collected in cloud forest. See Fig. 30 for data about seasonal activity and Fig. 31 for elevation.

Geographical distribution. (Fig. 25) Known from a limited area in the Oaxaca highlands on the Pacific side (Western Versant) of the state.

Geographical affinities. The geographical ranges of *C. crenatoverpa* (Fig. 15), *C. geminata* (Fig. 17), *C. huichilobos* (Fig. 18), *C. latiuscula* (Fig. 19), *C. p. toltec* (Fig. 20), and *C. rugofrons* (Fig. 24) are close enough to the range of *C. tonatiuh* (Fig. 25) to indicate the possibility of sympatry. Adults of *C. latiuscula* were captured at a site 13.9 km south of the type locality. The uppermost elevation recorded for *C. latiuscula* is 1400 m and the lowest for adults of *C. tonatiuh* is 1720 m. It appears that *C. latiuscula* and *C. tonatiuh* are spatially isolated by elevation (Fig. 31) even though both species occupy similar habitat, where they are known to occur in bromeliads.

Morphological affinities. Based on the structure of gonocoxite 2 (Fig. 13C), *C tonatiuh* is most closely related

to *C huichilobos* (Fig. 12D) and *C. rugofrons* (Fig. 13B).

Material examined. We have seen 65 specimens of this species. For details, see type material, above.

Cymindis (*Pinacodera*) *yaqui*, Hilchie & Ball, new species

(Figs. 2H, 5F, 7F, 9F, 11I –11K, 13D, 26, 30, 31)
http://zoobank.org/08336787-C959-4E72-940B-004DD5473F9E

Type material. HOLOTYPE: Male: "// U.S.A., Ariz. / Cochise Co. / CaveCreek Cn. / South Fork / Black lights // Lot No. 135 / VII-9-1964 / Evening / J. Stibick //" (USNM). PARATYPES, 30: **MÉXICO. Sonora:** 5.1 km NW, Huicoche, near Chihuahua border, 1577 m, UV, 11-13.VII.1989, S. McCleve, 1M (UASM); Rancho Aguajia, 16 km NW Yecora, oak-pine forest, UV light, 1311 m, 28-29.VII.1987, S. McCleve, 1M (UASM); 11.6 km NW, Yecora, 1650 m, 7-11.VIII.1990, P. & E. Jump, 1M (UASM). **U.S.A. Arizona:** *Cochise County*: *Chiricahua Mountains,* Cave Creek Canyon, S, Fork, black light, Lot. No. 140, 1620 m, 11. VII.1964, J. Stibick, 1M (USNM); 1.6 km S, Portal, 3.VII.1965, Mont Cazier, 1F (CMNH); 1.6 km S, Portal, 19.VI.1965, Mont Cazier, 1M (CMNH); Stewart Camp, 1.6 km S, Portal, UV, 18-20.VII.1971, J.T. Doyen, 3M, 3F (EMEC); Stewart Camp, 1.6 km S, Portal, UV, 25.VII.1971, J.T. Doyen, 1M (EMEC); *Huachuca Mountains*, Miller Canyon, 14.VII.1907, H.A. Kaeber, 1M (USNM); Sierra Vista, 16.VI.1967, R.F. Sternitzky, 2M (CNCI); Sierra Vista, 20.VI.1967, R.F. Sternitzky, 1M (CNCI); Sierra Vista, 25.VII.1967, R.F. Sternitzky, 2M (CNCI); Sierra Vista, IX.1967, R.F. Sternitzky, 2M (CNCI); "Huachuca Mountains", Cornell U. Lot 543, Sub. 724, 1M (CUIC); "Huachuca Mountains", 1F (CUIC); Ramsey Canyon, 24 km S, Sierra Vista, R.F. Sternitzky (CNCI)-(21.V.1967, 1M; 17.VI.1967, 1M; 11.VII.1967, 1M). *Pima County*: T19S R15E, Sec. 18, 11.VI.1962, D.H. Horn, 1M (OSUC). *Santa Cruz County*: Sonoita, 19.2 km S, Hidden Spring Canyon, 2.VI.1967, R.F. Sternitzky, 1M (CNCI). *Santa Rita Mountains*, Madera Canyon, 3.VII.1968, 1M (TAMU); 5.VII.1977, Rosenberg Collection, 1M (USNM).

Specific epithet. An aboriginal name (Yaqui language), treated as a Latin singular noun in apposition, named in honour of the Yaqui nation that inhabited the northwestern region of México and adjacent Arizona, the Sonoran region, roughly the area inhabited by the members of this species. These people were not part of the Aztec or Toltec empires.

Type locality. South Fork of Cave Creek Canyon, Chiricahua Mountains, Cochise County, Arizona, U.S.A.

Recognition. Adults of *C. yaqui* are likely to be confused with those of *C. punctifera punctifera* and *C. apache*, the three taxa whose geographical ranges overlap extensively in southwestern U.S.A. and adjacent northwestern México. All three are similar in body form, integumental macrosculpture, and color (dorsal surface of body rufotestaceous to rufous). Both *C. apache* and *C. p. punctifera* differ from *C. yaqui* in form of the elytral posterior (apical) sutural angle (round in *C. apache* (Fig. 2G) and *C. p. punctifera*, subangulate in *C. yaqui* (Fig. 2H)). Although size overlap is more or less extensive (Table 2), *C. yaqui* is larger on average than *C. p. punctifera*, and on average smaller than *C. apache*. In phallic details, males of these three taxa differ markedly: in form of preapex and apex (broadly spatulate in *C. apache* (Fig. 10B) narrower and knobbed in *C. p. punctifera* (Fig. 11B), and narrow and more or less pointed in *C. yaqui* (Figs. 11J, 11K); and in curvature of the shaft (displacement, Table 6). Females may be identified by association with males and the general form and curve of the elytral apex.

Description. Size and form average for *latiuscula* species subgroup, Data on variation in SBL, the ratio PL/PW, and in phallic measurements (MLp, MWp, MDp, and DPp), are presented in Tables 2 to 7.

Punctation and vestiture. Similar to adults of *C. apache,* vertex with irregular punctures, frons with few punctures, anteriolateral sculpture not expanded. Thorax. Pronotum. Average for *latiuscula* species subgroup (Fig. 9F).

Elytra. Average for *latiuscula* species subgroup (Fig. 2H).

Male genitalia. Phallus (Figs. 11I–11K) markedly long (Table 4), slightly wider than average for *latiuscula* species subgroup (Table 5), curvature about average (Table 6), preapex markedly elongate (Table 7), apex somewhat asymmetric, flattened, chisel-like (Fig. 11K). Endophallus without dense patches of microtrichia.

Female genitalia (Fig 13D). Ovipositor with gonocoxite 1 average for the subgroup, gonocoxite 2 tapered slightly from the base to the insertion point with the ensiform setae; apex bluntly pointed. The form is more similar to females of *C. latiuscula* (Fig. 12E) and *C. zacapa* (Fig. 13E), than to the two species it is sympatric with (*C. apache* Fig. 12A and *C. p. punctifera* Fig. 12F).

Habitat, habits and seasonal occurrence. Recorded elevations for *C. yaqui* extend from 1310 to 1650 m (Fig. 31). Most specimens were captured in June and July with one specimen captured in each of May, September and October (Fig. 30). When more data become available, we expect that the range of collection dates will be similar to those of *C. apache.*

Geographical distribution. (Fig. 26). Known only from the mountain ranges in southeastern Arizona, and from the northern Sierra Madre Occidental, in the state of Sonora, México.

Geographical affinities. See discussion under *C. apache.* The range of *C. yaqui* (Fig. 26) is overlapped completely by the ranges of *C. apache* (Fig. 14) and *C. p. punctifera* (Fig. 20).

Morphological affinities. *Cymindis apache* and *C. yaqui* appear to be closely related based on external morphological similarity and form of gonocoxite 2 (cf. Figs 13D and 12A) and their proximate geographical ranges (Figs. 14 and 26).

Material examined. We have seen 31 specimens of this species. For details, see type material, above.

Cymindis (*Pinacodera*) *zacapa* Hilchie & Ball, new species

(Figs. 7G, 9G, 11L, 11M, 13E, 22, 27, 30, 31)
http://zoobank.org/E37CAF8A-6A63-48EB-99DB-C4ECCB06EA85

Pinacodera cribrata (in part); Bates 1883: 188.

Note about synonymy. Bates (1883: 188) included in his list of localities for *P. cribrata* several sites in Guatemala. Because the only taxon of the *latiuscula* species subgroup

known from Guatemala is *C. zacapa,* it seems likely that these Bates specimens (BMNH) belong to this species. But this synonymy is conjectural, and awaits confirmation by examination of the specimens in question.

Type material. HOLOTYPE: Male: "// GUAT. Zacapa: La / Palmilla, 6 km sw / Teculutan, gallery / for. ca. 300 m. u-v / light 91-30 5.VI.1991 // G.E. & K.E. Ball / and D. Shpeley collectors // H.F. Howden / GUATEMALA / EXPED. 1991 //" (USNM). PARATYPES, 27: **COSTA RICA:** *Guanacaste Prov.*; Santa Rosa National Park, 12.XII.1978-10.I.1979, D.H. Janzen, 1M (USNM); Santa Rosa National Park, 13-15.VII.1980, D.H. Janzen, W. Hallwachs, 1F, (USNM). **GUATEMALA:** ALTA VERAPAZ: Cacao, Trece Aguas, 20.IV, Schwarz & Barber Coll., ADP 08663, 1F (USNM). IZABAL: Cayuga, IV.1915, ADP 08664, 1M (USNM). PROGRESO: Parque regional "Lo de China" c.a. 6 km E of El Jicaro N14º54.412' W89º50.413', 340 m, 4-5 June 2011, light traps R.S. Zack, 1M, 1F (WSUP). ZACAPA: road to San Lorenzo, 1000 m, MV & BL, 15.XI.2006, R. Turnbow, 1M (RHTC); 12-14 km S, San Lorenzo, 300-610 m, 3-6.VI.1989, J. E. Wappes, 1F (JEWC); La Palmilla, 6 km SW Teculutan, gallery for. UV light, ca. 300 m, 91-30, 5.VI.1991, H.F. Howden, G.E. & K.E. Ball, D. Shpeley, 1M (UASM). "Santa Cruz" Marble Quarry Rd, NE of Teculutan, 573 m, 17 May 2006, N15º02.604' W89º40.126', R.S. Zack, mv/bl light traps, 1M, 2F (WSUP). **HONDURAS:** Intercepted with plants at Miami, Florida, 8.III.1966, 1F (FSCA). Departement SANTA ROSA DE COPAN**:** 16 km NW, Santa Rosa de Copan, 8.X.1993, R. Turnbow, 1F (RHTC). Departement de COMAYAGUA: Rancho Chiquito, km. 62, UV light, 29.V.1964, F.S. Blanton, A.B. Broce, R.E. Woodruff, 3M, 2F (USNM); Rancho Chiquito, km. 62, UV light, 850 m, 7.VI.1964, F.S. Blanton, A.B. Broce, R.E. Woodruff, 1F (UASM); 22.4 km NW Siguatepeque, 610 m, 21.VII.1974, O'Brien & Marshall, 1F (USNM). Departement de EL PARAISO: Vic Yuscaran, 16.X.1993, R. Turnbow, 1M (RHTC); Yuscaran, 14.VII.2001, R. Turnbow, 1F (RHTC). Departement de MORAZAN: Escuela, 5 km E, Agricola Panamericana, 2.VI.1993, M.C. Thomas, 1M (FSCA); Esc. Agr. Pan. Zamorana, 820 m (encinal), 22.VII.1948, T.H. Hubbell U of Michigan, 1M 1F, (USNM). **NICARAGUA.** GRANADA: Laguna de Apoyo, 20-22.V.2005, van den Berghe, 1F (CMNH); Domitila, 20.VI.2004**,** van den Berghe, 1F (CMNH).

Specific epithet. An aboriginal (Nahuatl) name used as a singular Latin noun in apposition, based on the name of the Department of Zacapa in Guatemala in which the type locality of this species is located.

Type locality. 6 km southwest of La Palmilla, Department of Zacapa, Guatemala.

Recognition. Similar to *C. latiuscula* in overall appearance and size. Readily distinguished by the head width and unique sculpture pattern. Males are distinguished by phallic form (Figs. 11L, 11M).

Description. Data on variation in SBL, the ratio PL/PW, and in phallic measurements (MLp, MWp, MDp, and DPp), are presented in Tables 2 to 7.

Head capsule (Fig. 7G) with frontal punctures covering a broad area of the vertex, frons with transverse macrosculpture.

Thorax. Pronotum wider than average (Table 3, Fig. 9G).

Elytra. Average for *latiuscula* species subgroup.

Male genitalia. Phallus (Figs. 11L, 11M), moderately short (Table 4), rather narrow (Table 5), curvature about average for *latiuscula* species subgroup (Table 6), preapex short (Table 7), apex (Fig. 11L) obliquely truncate, hooked ventrad. Endophallus with dense microtrichial patches.

Female genitalia (Fig. 13E). Ovipositor with gonocoxite 1 about average for the subgroup, gonocoxite 2, sides parallel from base to the insertion point with the ensiform setae; apex broadly pointed.

Habitat, habits and seasonal occurrence. Adults of *C. zacapa* have been collected from 300 to 1000 m (Fig. 31), most specimens at UV or MV lights. Collection dates range from February to July, and October to December (Fig. 30). This range is likely a collecting artifact due to small sample size. The greatest number of collecting events was in June and July. Beetles of this species are expected to be active year-round in the tropical and subtropical forests. One locality label indicated gallery forest.

Geographical distribution. (Fig. 27). The geographical range of *C. zacapa* extends on the Pacific side of Middle America from Costa Rica northward to Guatemala.

Geographical affinities. The range of *C. zacapa* (Fig. 27) abuts with the common widespread species *C. latiuscula* (Fig. 19).

Morphological affinities. Based on similarity of endophallic armature, gonocoxite 2 and largely allopatric distribution, this species and *C. latiuscula* are postulated to be adelphotaxa. On the other hand, overall appearance of the phallus suggests a close relationship of *C. zacapa* to *C. huichilobos* (Fig. 11L; cf. Fig. 10K). SBL (nonoverlapping size range, Table 2) and differences in curvature of the phallus coupled with the different shape of the pronotum indicate separate species (Fig. 22).

Material examined. We have seen 32 specimens of this species. For details, see type material, above.

Cymindis (*Pinacodera*) *zapotec* Hilchie & Ball, new species

(Figs. 7H, 7I, 9H, 9I, 13F, 28, 31)
http://zoobank.org/B9421E58-6A49-48F6-B999-5428EDFAD150

Type material. 2: HOLOTYPE: Female, labeled: // MEX: Oax. 24.3 km N. / San Gabriel Mixtepec / 1174 m 11.vii.87 87-14 / R. Anderson cloud for. // (USNM). PARATYPE (1): **MÉXICO:** *Guerrero*; El Paraiso, 15 km NW, at edge of stream, 1190 m, 9.Aug. 1986, J. Rawlins, R. Davidson, 1F (FMNH).

Specific epithet. The name is used as a singular Latin noun in apposition based on the name Zapotec. The name comes from (Nahuatl) which means "inhabitants of the place of sapote". Zapotec were an indigenous pre-Columbian civilization that occupied the valleys of Oaxaca in Mesoamerica.

Recognition. Head capsule (Figs. 7H, 7I) is similar to that of *C. latiuscula* (Fig. 6F), and the form of the pronotum (9H, 9I) is similar to that of *C. geminata* (Fig. 8D); differing from these two species by the posteriolateral impressions of the pronotum being deeper, showing greater relief. Female gonocoxite 2 is scythe-like (Fig. 13F), and most similar in shape to that seen in females of *C. crenatoverpa* (Fig. 12 B) and *C. geminata* (Fig. 12C). The basal ensiform setae

of *C. zapotec* (Fig. 13F) are thicker than those seen in *C. crenatoverpa* (Fig. 12 B) and *C. geminata* (Fig. 12C).

Description. In form, similar to *C. latiuscula* (Fig. 1). Head (Fig. 7H, 7I), almost devoid of setae, inner ridge prominent, continuous to near posterior supraorbital setae; vertex finely, sparsely punctate, with a few punctures on the lower frons; fronto-clypeal groove without obvious sculpture, well developed.

Thorax. Pronotum (Fig. 9I) with lateral margins markedly curved, punctures with transverse grooves; posteriolateral depressions deeper than average.

Elytra. Average for *latiuscula* species subgroup.

Male Genitalia. Unknown.

Female Genitalia. Ovipositor with gonocoxa 2 (Fig. 13F), apical portion thin and scythe-like. Basal most ensiform setae thicker (Fig. 13F) than those seen in *C. crenatoverpa* (Fig. 12 B) and *C. geminata* (Fig. 12C).

Habitat. Collected at edge of stream, at 1190 m, and in cloud forest at 1174 m. Dates of collection are July 11 and August 9.

Geographical distribution. Known from the western Mexican states of Guerrero and Oaxaca, in the Sierra Madre del Sur (Fig. 28).

Geographical affinities. The range (Fig. 28) of *Cymindis zapotec* is within the known geographical ranges of *C. geminata*, (Fig. 17), *C. latiuscula* (Fig. 19), and *C. punctifera toltec* (Fig. 20).

Morphological affinities. The form of gonocoxite 2 aligns *C. zapotec* (Fig 13F) with females of *C. crenatoverpa* (Fig. 12B) and *C. geminata* (Fig 12C).

Material examined. We have seen two specimens from the localities noted above.

Evolutionary Aspects

Overall, the members of the *latiuscula* subgroup are relatively uniform in appearance, (size, vestiture, and sculpture). The species can be arranged in three general geographic divisions (Table 8): a southern one (Nuclear Middle America to the Isthmus of Tehuantepec), including *C. latiuscula* and *C. zacapa*; a central one, from the Isthmus of Tehuantepec northward to about the Tropic of Cancer, including *C. crenatoverpa, C. cuyuteca, C. geminata, C. huichilobos, C. punctifera toltec, C. rugofrons, C. tonatiuh and C zapotec;* and a northern one (northwestern México, southwestern USA), including *C. apache, C. punctifera punctifera* and *C. yaqui*.

Species of the northern assemblage are virtually indistinguishable from each other, excepting in minor differences in size and sculpture (cf. Figs. 6A, 7A, 7F, 8A, 9A, 9F). The key diagnostic character suite is in the phallus. Interpretation of relationship based on form of the preapex (distinctly flattened) suggests that *C. apache* (Figs. 10A, 10B) and *C. yaqui* (Figs. 11I, 11J, 11K) are more closely related to each other than to *C. punctifera punctifera* (Figs. 11A, 11B). The known ecological and behavioral parameters are not much help in postulating relationships: all three have similar geographic ranges, similar altitudinal preferences, similar vegetation associations of dry pine/ oak temperate forests, and occasional records of being found in leaf litter or under objects. All fly and are attracted to UV lights.

Teasing apart relationships for the central group is similarly difficult. *Cymindis rugofrons* stands apart from all other *latiuscula* subgroup members on the basis of 6 setae on abdominal sternum VII (Fig. 2E), and greater rugosity of sculpture on the frons (Fig. 5D). The mid altitudinal habitat preference, in an oak pine association seen in *C. rugofrons*, is the norm for most of the central group as is the case for *C. rugofrons*.

Form of the pronotum shows a trend (Table 3) from a relatively narrow form typical of *C. geminata* and *C. huichilobos* (Figs. 8D, 8E) to a broader shape as seen in *C. latiuscula* and *C. zacapa* (Figs. 8F, 8G, 9G). Members of the latter species pair typically occur at lower elevations (Fig. 30), and for *C. latiuscula* the beetles are commonly collected in bromeliads.

Most species in the *latiuscula* subgroup have a narrower pronotum, and are found at mid altitudes in oak-acacia, oak-pine forest, and thorn-scrub associations. *Cymindis tonatiuh* breaks the trend by being associated with bromeliads, yet maintains a midaltitude habitat preference in cloud forest. One wide ranging subspecies, *C. punctifera toltec*, exhibits considerable variation in pronotal width/ length ratios (Figs. 9B, 9C), and has variable form of the preapex of the male phallus. In a few populations, the form of the preapex approaches that seen in *C. p. punctifera* (Figs. 11A, 11B) to that typically seen in *C. p. toltec* (Figs. 11C, 11D, 11E) suggesting a mixing or a resorting of genes. The large range exhibited by this species covers many types of habitat, which exerts variable selective pressures on different populations, perhaps driving a speciation event. This might explain the variability in form.

Specimens of *C. geminata* resemble those of *C. p. toltec* in general shape and size, but differ significantly in the length of the preapex of the phallus (Table 7), and exhibit larger and deeper punctures on the pronotum (Fig. 8D). The head appears slightly longer (not quantified) and narrower (Fig 6D) than what is seen in *C. p. toltec* (Figs. 7B, 7C). It is likely *C. geminata* is closely related to *C. p. toltec*. Habitat and altitudinal preferences are similar between the two taxa.

On the basis of the downward hooking of the preapex, the phallus of male *C. huichilobos* (cf. Figs. 10K & 11L) is similar to that seen in males of *C. zacapa*. Males of *C. huichilobos* differ by having a narrower pronotal profile than what is seen in males of *C. zacapa* (Figs. 8E vs. 9G, Table 3). Both species occupy low elevation habitats in the tropical to subtropical zone.

The next in the series of species, do not have any clear synapotypic characters, which would demarcate the order. Specimens of *C. crenatoverpa* do not pair with any other species in the *latiuscula* subgroup. This is based on the markedly distinctive form of the preapex with the distinct notch in the side (Figs. 10C & 10F). Habitat choice and mid altitude preference is typical. Geographic range is in the Trans Volcanic Sierra of western México.

A second species that does not exhibit obvious pairing is *C. cuyuteca*. Again, the form of the phallus is distinctive (Fig. 10G). The form of pronotum is average for the *latiuscula* species subgroup and habitat preferences are similar to the norm: leaf litter in a pine-oak forest association at mid altitude. Geographically the species is known from one locality in western México.

Another species, that stands by itself is *C. tonatiuh*: the form of the phallus is simple (plesiotypic?) (Fig. 11H). An apotypic feature, which sets this species aside from all other

C. latiuscula subgroup members is the unusual angle of the elytral apices (Fig. 2F).

Presence of six setae on abdominal sternum VII (Fig. 2E) on specimens of *C. rugofrons* is a marked deviation from the four associated with other *Cymindis* (Fig. 2B). Coarseness of sculpture on the head can be envisioned as an end of a transformation series with the condition represented by *C. latiuscula* at the other extreme. The simple form of the phallus (Fig. 11F) helps place *C. rugofrons* in a basal position within the *C. latiuscula* subgroup.

As drawn, all branches indicate monophyly in a reconstructed phylogeny (Fig. 32) and is dominated by a basal polytomy. Ecological and geographical characters help to group and order the species. More characters are needed; perhaps these will be found in the larvae, and pupae, and in finer resolution of the species' ecological niches. Characteristics of additional species in the *latiuscula* species subgroup yet to be discovered may contribute a better understanding of relationships.

The driver of speciation in the *latiuscula* species subgroup is likely reflected by similar changes in the vegetational composition and geographical shifts. Floral community shifts are well documented in the deserts (Axelrod 1979, Van Devender 1990) of Mesoamerica during the Quaternary Period. In general, when the climate cooled, the floral communities shifted to lower elevations. Oak and pine forests spread down the mountainsides and out across many valleys, depending on elevation and moisture regimes. It is at this time that major dispersal of *C. punctifera* would have likely occurred, spreading down slope and southward in latitude, tracking the semi-arid oak-pine forest vegetation association. These forests would have ebbed and flowed many times during the last 40,000 years, perhaps peaking in extent around 12,000 to 20,000 BP.

Similar vegetation realignments were taking place with the tropical and subtropical forests further south, only these would more or less be extirpated and be replaced by the oak, pine and thorn scrub vegetation associations on the lowlands as suggested by a temperature drop of about 5^{o} C (Toledo 1982). The insect fauna that could track or adapt to these changes would tend to flourish. Most members of the *latiuscula* subgroup are presently found at mid elevations with only a few species found at low elevation (Fig. 31).

Upon returning to modern climatic conditions, the flora and fauna would move back up in elevation and latitude, in essence overrunning fragments of previous associations. This is clearly shown by isolated temperate tree species in the subtropical forests of Veracruz (Toledo 1982).

CLOSING REMARKS

Members of the *C. latiuscula* subgroup occupy primarily temperate oak pine environment at mid elevations. Some taxa are known from cloud forest and a few others are in tropical to subtropical regions. Very little is known about life history apart from some species appearing to be arboreal while others appear in part terrestrial, and all, readily disperse by flight. The reconstructed phylogeny is inconclusive; further analysis of other *Pinacodera* groups and examining life stages may assist in resolving this problem.

ACKNOWLEDGEMENTS

We thank the curators (past and present, whose names are listed in the Materials section) for the loan of the specimens on which this study is based, Diane Hollingdale, for drawing Figures 2C-H and 3. We thank George Braybrook (Earth and Atmospheric Sciences, University of Alberta) for assistance with Scanning Electron Microscope photography and Danny Shpeley for assistance with macro photography and Automontage assembly of the photographs.

LITERATURE CITED

Allen R.T. and G.E., Ball. 1980. Synopsis of Mexican taxa of the *Loxandrus* series (Coleoptera: Carabidae: Pterostichini). *Transactions of the American Entomological Society,* 105: 481-576.

Ax, P. 1987. The phylogenetic system – the systematization of organisms on the basis of their phylogenesis. John Wiley & Sons, Chichester, New York.

Axelrod, D.I. 1979.Age and origin of Sonoran Desert vegetation. *California Academy of Sciences Occasional Papers,* 132: 1-74.

Ball, G.E. 1960. Fascicle 4, pp. 55-210. *In* Arnett, R. H. 1960. The beetles of the United States (a manual for identification). The Catholic University of America Press, Washington, D. C.

Ball, G.E. 1975. Pericaline Lebiini: Notes on classification, a synopsis of the New World genera, and a revision of the genus *Phloeoxena* Chaudoir (Coleoptera: Carabidae). *Quaestiones Entomologicae,* 11: 143-242.

Ball, G.E. 1978. The species of the Neotropical genus *Trichopselaphus* Chaudoir (Coleoptera: Carabidae: Harpalini): classification, phylogeny and zoogeography. *Quaestiones Entomologicae,* 14: 447-489.

Ball, G.E. 1982. Evaluation of the Baron Maximilien de Chaudoir's contribution to the classification of the cymindine Lebinii and Masoreimorphi. The Coleopterists Bulletin 36 (3): 512-529

Ball, G.E. and Y. Bousquet. 2001. Family 6 Carabidae. *In* Arnett R.H., M.C. Thomas, eds. American Beetles: Archostemata, Myxophaga, Polyphaga: Staphyliniformia, Volume 1. CRC Press, Boca Raton, Florida. pp. 32-132.

Ball, G.E. and G.J. Hilchie. 1983. Cymindine, Lebiini of authors: redefinition and reclassification of genera (Coleoptera: Carabidae). *Quaestiones Entomologicae,* 19: 93-216.

Ball, G.E. and D. Shpeley. 2001. A taxonomic review of species of the Neotropical pericaline genus *Oreodicastes* Maindron, 1905 (Coleoptera: Carabidae: Lebiini). *Insecta Mundi,* 15 (2): 71-76.

Basilewsky, P. 1984. Essai d'une classification supragénérique naturelle des Carabides Lébiens d'Afrique et de Madagascar. *Revue de Zoologie Africaine,* 98: 525-559.

Bates, H.W. 1881-1883. Biologia Centrali-Americana, Insecta, Coleoptera. Vol. 1 Par. 1. (1883) p.188 Tab. VIII, Fig.1. F.D. Godman and O. Salvin, eds. and publishers, London Great Britain.

Bils, W. 1976. Das abdomend weiblicher, terrestrich lebender Adephaga (Coleoptera) und seine Bedeutung für die Phylogenie. *Zoomorphologie,* 84 (2):113-193.

Blackwelder, R.E. 1944. Checklist of the coleopterous insects of Mexico, Central America, the West Indies,

and South America. Part 1. *Bulletin of the United States National Museum*, 185: 1-188.

Blatchley, W.S. 1910. An illustrated descriptive catalogue of the Coleoptera or beetles (exclusive of the Rhynchophora) known to occur in Indiana, with bibliography and descriptions of new species. The Nature Publishing Company, Indianapolis, Indiana.

Bousquet, Y. 2012. Catalogue of Geodephaga (Coleoptera, Adephaga) of America north of Mexico, Part 3 Sphodrini- Pseudomorphini. *ZooKeys,* 245 (Special Issue). Pensoft Sofia-Moscow.

Bousquet, Y. and A. Larochelle. 1993. Catalogue of the Geodephaga (Coleoptera: Trachypachidae, Rhysodidae, Carabidae, including Cicindelini) of America north of Mexico. *Memoirs of the Entomological Society of Canada*, 167: 1-397.

Casey, T.L. 1920. Random studies amoung the American Caraboidea. In Casey, T.L. Memoirs on the Coleoptera. Volume IX. pp. 133-299. New era Publishing Company, Lancaster, Pennsylvania.

Chaudoir, M. de.1875. Genres aberrants du groupe des cymindides *Bulletin de la Société Imperiale des Nauralistes du Moscou,* 49 (2): 1–61

Ciegler, J.C. 2000. Ground beetles and wrinkled bark beetles of South Carolina (Coleoptera: Geadephaga: Carabidae and Rhysodidae). South Carolina Agriculture and Forestry Research System, Clemson University.

Csiki, E. 1932. Coleoptera, Carabidae, Pars 124, Harpalinae VII, pp. 1279-1598. In: Junk W., S. Schenkling, eds. 1909-Coleopterorum Catalogus. Berlin and ‘s-Gravenhage.

Darlington, P.J. Jr. 1980. Evolution for Naturalists: the simple principles and complex reality. John Wiley and Sons, New York.

Dejean, P.F.M.A. 1831. Spécies général des Coléoptères de la collection de M. le comte Dejean Vol 5. Mequigon-Marvis, Paris.

Deuve, T. 1993. L’abdomen et les genitalia des femelles de Coléoptères Adephaga. *Mémoires du Muséum National d’Histoire, Naturelle*, 155:1-185.

Van Devender, T.R. 1990. Late quaternary vegetation and climate of the Sonoran Desert. In: Betancourt J.L., T.R van Devender, P.S. Martin. Packrat middens, the last 40,000 years of biotic change. University of Arizona Press, Tucson. pp. 134-165.

Erwin, T.L., D.R. Whitehead, and G.E. Ball. 1977. Family 4. Carabidae. The Ground beetles, pp. 4.1-4.68. *In* Blackwelder, R.E. and R.H. Arnett. Checklist of the beetles of Canada, United States, Mexico, Central America, and the West Indies. World Digest Publications, Oxycopis Pond, Wallace Road, Kinderhook, New York.

Halffter, G. 1987. Biogeography of the montane entomofauna of Mexico and Central America. *Annual Review of Entomology,* 32: 95-114.

Hennig, W. 1966. Phylogenetic Systematics. University of Illinois Press, Urbana/ Chicago/ London.

Hunting, W.M. 2013. A taxonomic revision of the *Cymindis (Pinacodera) limbata* species group (Coleoptera, Carabidae, Lebiinini), including description of a new species from Florida, U.S.A. *ZooKeys,* 259: 1073. doi: 10.3897/zookeys.259.2970

Horn, G.H. 1881. On the genera of Carabidae with special reference to the fauna of Boreal America. *Transactions of the American Entomological Society,* 9: 91-196, plates 1-10.

Horn, G.H. 1882. Synopsis of the tribe Lebiini. *Transactions of the American Entomological Society*, 10: 126-164

Jeannel, R. 1949. Coléoptères carabiques del Region malgache (troisieme partie). Faune de l’Empire françiais XI, pp.767-1146, figs. 365-548.

Latreille, P.A. 1805. Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita, iconibus exemplisque plurimus explicata. Tomus primus. Paris and Argentorat: A Koenig.

LeConte, J.L. 1859. The Coleoptera of Kansas and eastern New Mexico. Smithsonian Contributions to Knowledge, 11: vi + 58 pp, 2 plates, 1 map.

LeConte, J.L. 1884. Short studies of North American Coleoptera. No. 2. *Transactions of the American Entomological Society,* 12: 1-32.

LeConte, J.L. and G.H. Horn. 1883. Classification of the Coleoptera of North America. Prepared for the Smithsonian Institution. Smithsonian Miscellaneous Collections. 26 (4) (No. 507) xxxvii 567.

Leng, C.W. 1920. Catalogue of the Coleoptera of America north of Mexico. John Sherman, Jr., Mount Vernon, New York.

Liebherr, J.K. and K.W. Will. 1998. Inferring phylogenetic relationships within the Carabidae (Insecta, Coleoptera) from characters of the female reproductive tract., In: Ball G.E., A. Casale, A. Vigna Taglianti, eds. Phylogeny and Classification of Caraboidea (Coleoptera: Adephaga): Proceedings of a Symposium (28 August, 1996, Florence, Italy) XX International Congress of Entomology. Atti, Museo Regionali di Scienze Naturali, Torino, Italy. pp. 107–170.

Lindroth, C.H. 1969. The ground beetles of Canada and Alaska. Part 6. *Opuscula Entomologica, Supplementum,* 34: 945-1192.

Lorenz, W. 2005. A Systematic List of Extant Ground Beetles of the World (Coleoptera “Geadephaga”: Trachypachidae and Carabidae, incl. Paussinae, Cicindelinae, Rhysodinae). Second edition. – (Tutzing). ISBN 3-933 896-06-1

Madge, R.B. 1967. A revision of the genus *Lebia* Latreille in America north of Mexico (Coleoptera, Carabidae). *Quaestiones Entomologicae,* 3: 139-242.

Mahar, J.M. 1978. The life history of *Pinacodera limbata* Dejean and *Pinacodera platicollis* Say (Coleoptera: Carabidae) in oak forests in Michigan. Unpublished M.S. Thesis, Michigan State University, East Lansing, Michigan.

Marshall, C.J. and J.K. Liebherr. 2000. Cladistic biogeography of the Mexican transition zone. *Journal of Biogeography,* 27: 203-216.

Mayr, E. 1942. Systematics and the Origin of Species from the Viewpoint of a Zoologist. Columbia University Press, New York.

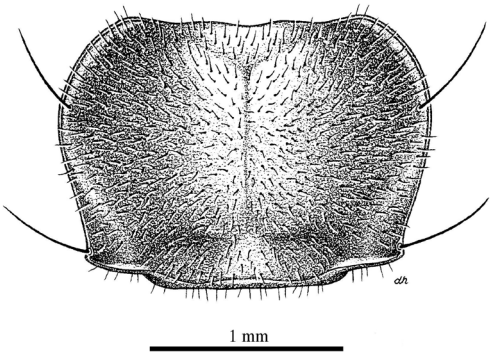
Say, T. 1823. Descriptions of insects of the families of Carabidae and Hydrocanthari of Latreille, inhabiting North America. *Transactions American Philosophical Society (N. S.)* 2 (1825) p. 1-109.

Shpeley, D. and G.E. Ball. 2000. A taxonomic review of the subtribe Pericalina (Coleoptera: Carabidae: Lebiini) in the Western Hemisphere, with descriptions of new species and notes about classification and zoogeography.

Insecta Mundi, 14 (1-3): 1-185.
Toledo, V.M. 1982. Pleistocene Changes of vegetation in tropical México. In: Prance, G.T. ed. *Biological diversification in the Tropics*. Columbia University Press, New York, 93-111.
Tuomikoski, R. 1967. Notes on some principles of phylogenetic systematics. *Annales Entomologici Fennici,* 33:137–147.
Willis, H. 1967. Bionomics and zoogeography of tiger beetles of saline habitats in central USA. *University of Kansas Science Bulletin,* 47:143-313.

Recibido: 26 de mayo 2023
Aceptado: 12 de diciembre 2023

Figure 1. Habitus photograph of *Cymindis* (*Pinacodera*) *latiuscula* (Chaudoir 1875). Male, Ruinas de Kabah, Yucatan, México, Scale bar = 1 mm.



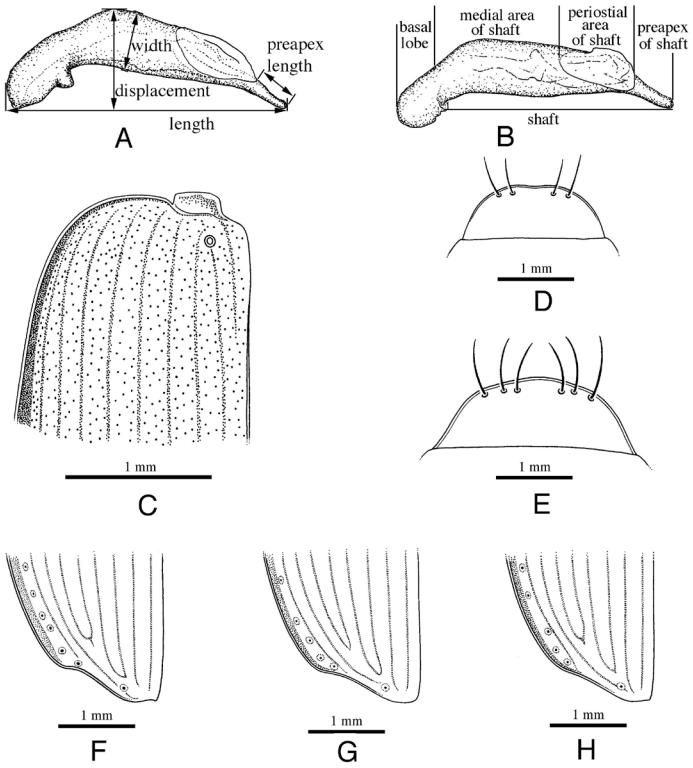


Fig. 2.(up) Line drawings illustrating various structures of *C.* (*Pinacodera*). **A**. Phallus, left lateral aspect, showing axes of measurements. **B**. Phallus, left lateral aspect, showing areas used in descriptions. **C.** Basal third of left elytron, dorsal aspect, showing strial and puncture patterns of *C. punctifera* (LeConte). **D**. Sternum VII, ventral aspect, showing posterior marginal setae, of *C. punctifera* (LeConte). **E.** Same, of *C. rugofrons*, **new species**. **F**, **G**, **H**, Apical one third of left elytron, showing apical margin, respectively, of **F**, *C. tonatiuh*, **new species**, **G**, *C. apache,* **new species**, and **H**, *C. yaqui*, **new species**. Scale bars = 1 mm.

Fig. 3.(left) Line drawing, dorsal aspect, of pronotum, showing punctation and setal patterns of *C. punctifera punctifera* (LeConte). Scale bar = 1 mm.

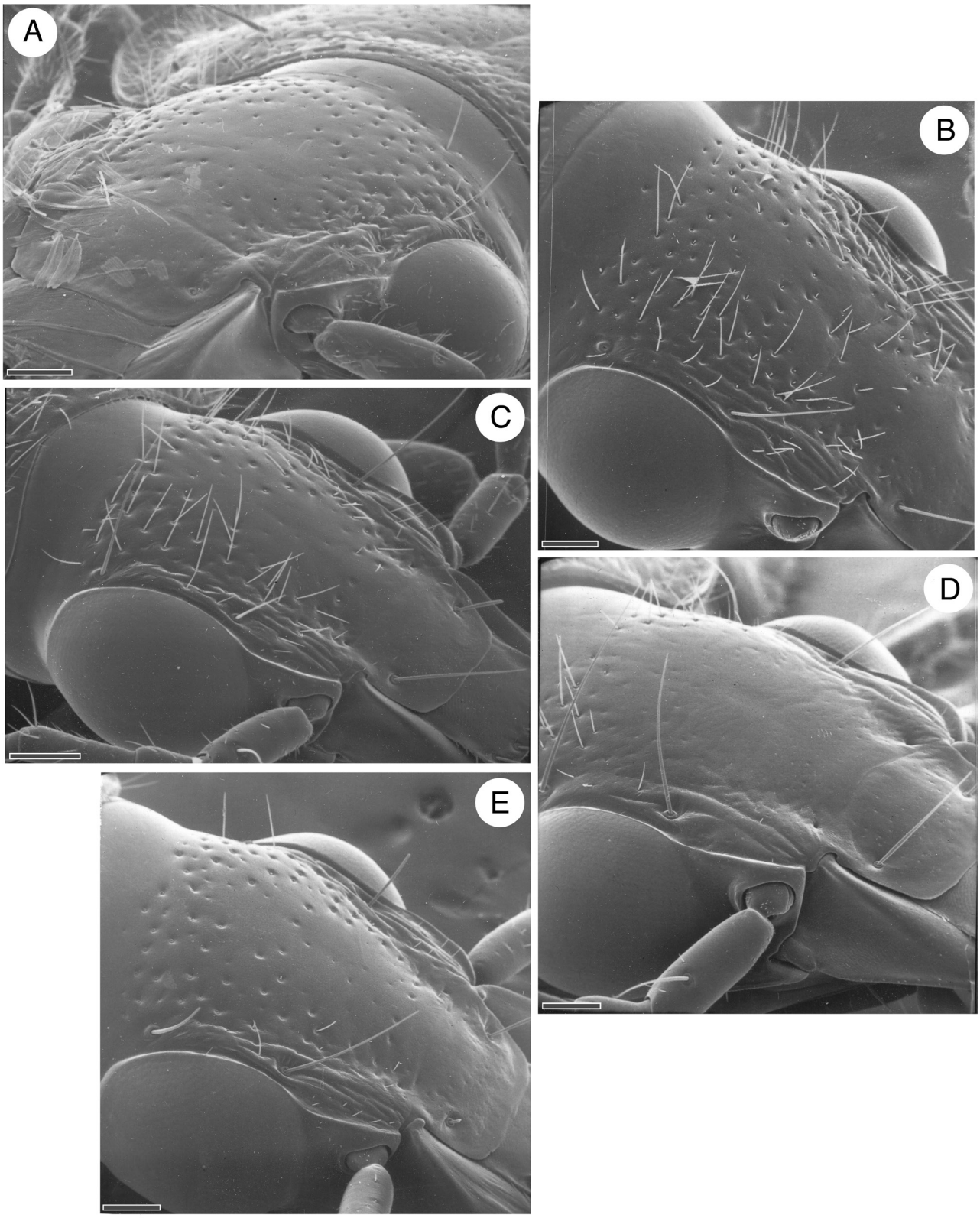


Figure 4. SEM photographs of head capsules, dorsal oblique aspect, showing puncture and setal patterns of species of *C.* (*Pinacodera) latiuscula* species subgroup: **A**, *C. apache* **new species**, Sierra Vista, Cochise Co., Arizona, U.S.A.; **B**, *crenatoverpa*, **new species**, Temascaltepec, state of México, México; **C**, *C. geminata,* **new species,** Cuernavaca, Morelos, México; **D**, *C. latiuscula* (Chaudoir), Catemaco, Veracruz, México); **E**, *C. latiuscula* (Chaudoir), Cuernavaca, Morelos, México. Scale bar =0.2 mm.

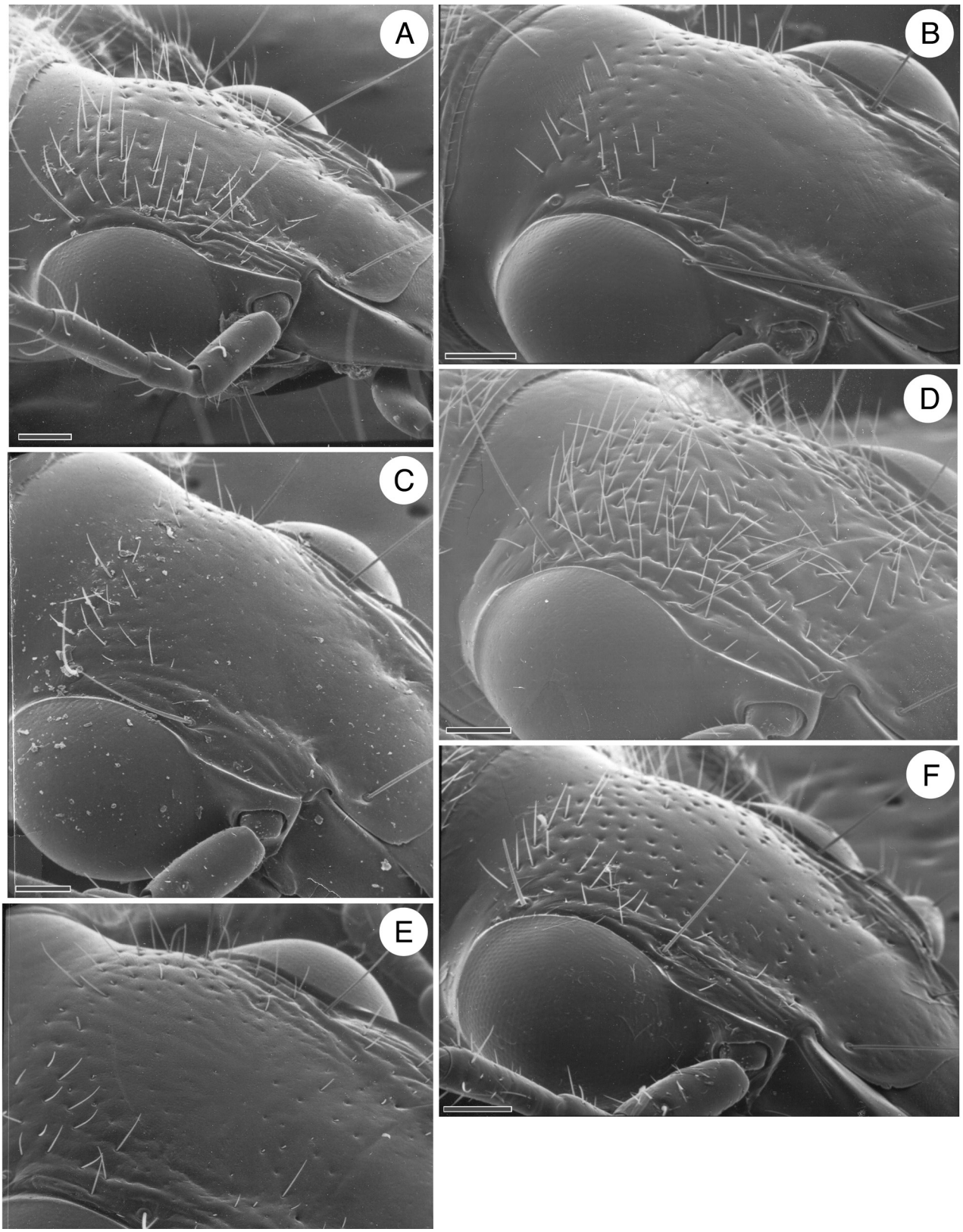


Figure 5. SEM photographs of head capsules, dorsal oblique aspect, showing puncture and setal patterns of species of *C.* (*Pinacodera) latiuscula* species subgroup: **A**, *C. punctifera punctifera* (LeConte), Huachuca Mountains, Cochise Co., Arizona, U.S.A.; **B**, *C. punctifera toltec*, **new subspecies**, Mazatlan, Sinaloa, México; **C**, *C. latiuscula* (Chaudoir)**,** Jalapa, Veracruz, México; **D**, *C. rugofrons,* **new species**, Los Volcanes, Jalisco, México; **E**, *C. tonatiuh,* **new species**, Juchatengo, Oaxaca, México; **F**, *C. yaqui*, **new species**, Sierra Vista, Cochise Co., Arizona, U.S.A. Scale bar = 0.2 mm.

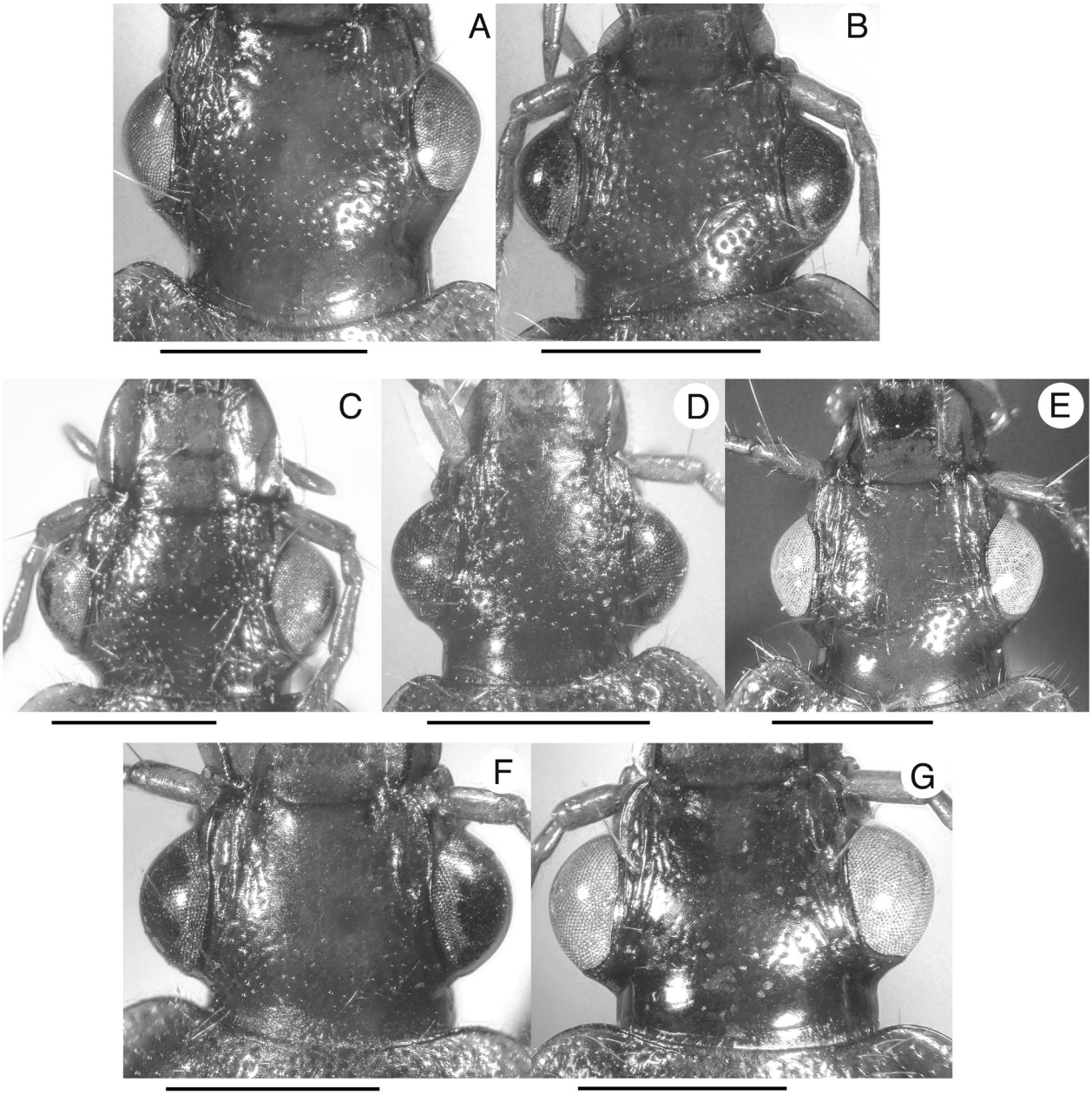


Figure 6. Automontage photographs of head capsules, dorsal aspect, showing puncture and setal patterns of species of *C.* (*Pinacodera) latiuscula* species subgroup: **A**, *C. apache* **new species**, Madera Canyon, Santa Rita Mountains, Sana Cruz Co., Arizona, U.S.A.; **B**, *C. crenatoverpa*, **new species**, Rincón, Temascaltepec, state of México, México; **C,** *C. cuyuteca*, **new species**, Cuautla, Jalisco, México; **D**, *C. geminata,* **new species**, Cuernavaca, Morelos, México; **E**, *C. huichilobos,* **new species**, Puerto Angel, Oaxaca, México; **F**, *C. latiuscula* (Chaudoir), Puente Nacional, Veracruz, México; **G**, *C. latiuscula* (Chaudoir), Xcalacoop, Yucatán, México. Scale bar = 1 mm.

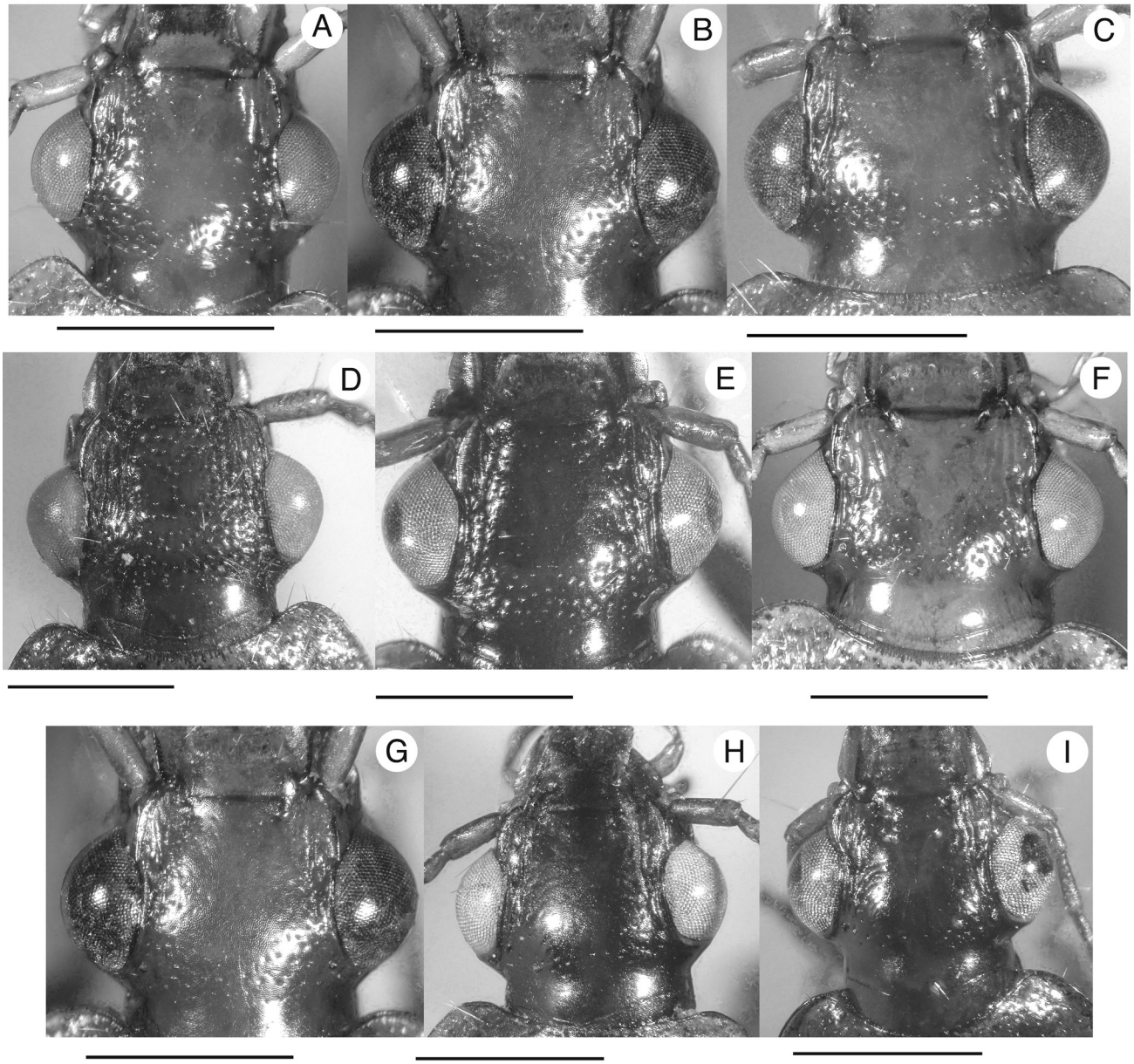


Figure 7. Automontage photographs of head capsules, dorsal aspect, showing puncture and setal patterns of species of *C.* (*Pinacodera) latiuscula* species subgroup: **A**, *C. punctifera punctifera* (LeConte), Madera Canyon, Santa Rita Mountains, Santa Cruz Co., Arizona, U.S.A.; **B**, *C. punctifera toltec*, **new subspecies**, El Camarón, Oaxaca, México; **C**, *C. punctifera toltec*, **new subspecies**, Cuernavaca, Morelos, México; **D**, *C. rugofrons,* **new species**, Volcán Colima, Colima, México; **E**, *C. tonatiuh,* **new species**, San Pedro y Pablo Ayutla, Oaxaca, México; **F**, *C. yaqui*, **new species**, Ramsey Canyon, Huachuca Mountains, Cochise Co., Arizona, U.S.A.; **G**, *C. zacapa*, **new species**, San Lorenzo, Zacapa, Guatemala; **H**, *C. zapotec,* **new species**, El Paraiso, Guerrero, México; **I**, *C. zapotec,* **new species**, San Gabriel Mixtepec, Oaxaca, México. Scale bar = 1 mm.

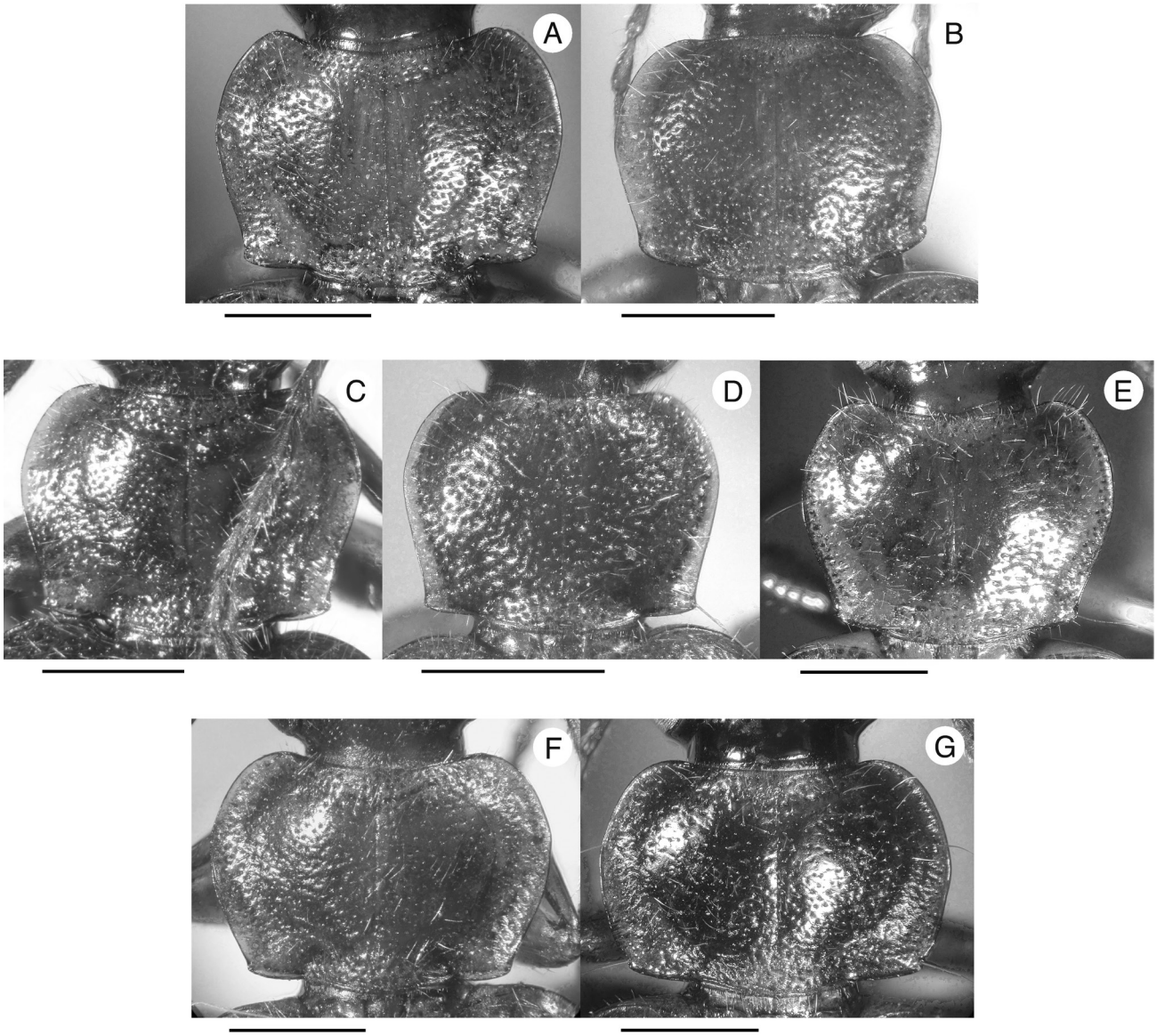


Figure 8. Automontage photographs of prothoraces, dorsal aspect, showing puncture and setal patterns of species of *C.* (*Pinacodera) latiuscula* species suibgroup: **A**, *C. apache,* **new species**, Madera Canyon, Santa Rita Mountains, Sana Cruz Co., Arizona, U.S.A.; **B**, *C. crenatoverpa*, **new species**, Rincón, Temascaltepec, state of México, México; **C**, *C. cuyuteca,* **new species**, Cuautla, Jalisco, México; **D**, *C. geminata,* **new species**, Cuernavaca, Morelos, México; **E**, *C. huichilobos,* **new species**, Puerto Angel, Oaxaca, México; **F**, *C. latiuscula* (Chaudoir), Puente Nacional, Veracruz, México; **G**, *C. latiuscula* (Chaudoir), Xcalacoop, Yucatán, México. Scale bar = 1 mm.

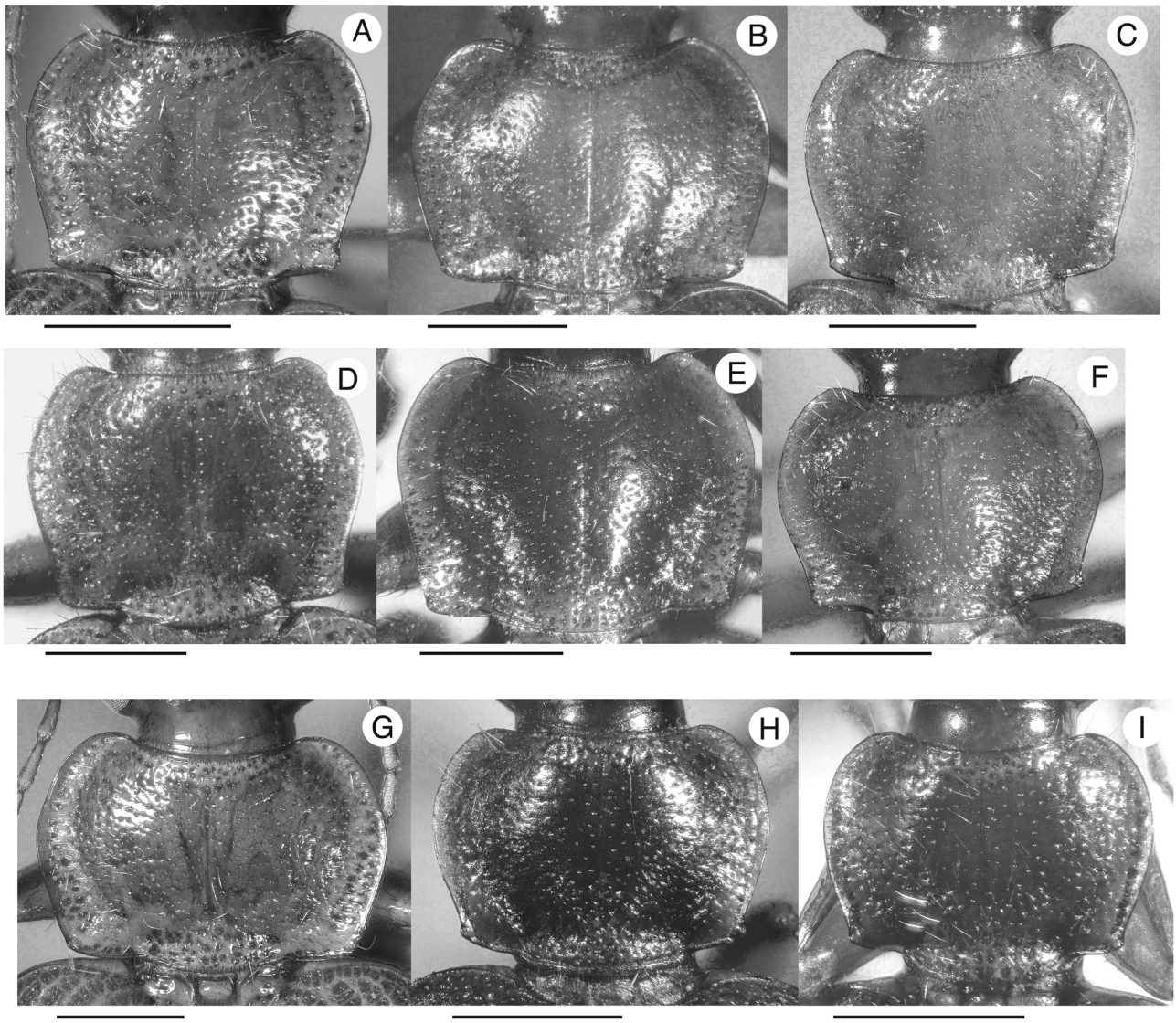


Figure 9. Automontage photographs of prothoraces, dorsal aspect, showing puncture and setal patterns of species of *C.* (*Pinacodera) latiuscula* species subgroup: **A**, *C. punctifera punctifera* (LeConte), Madera Canyon, Santa Rita Mountains, Santa Cruz Co., Arizona, U.S.A.; **B**, *C. punctifera toltec*, **new subspecies**, El Camarón, Oaxaca, México; **C**, *C. punctifera toltec*, **new subspecies**, Cuernavaca, Morelos, México; **D**, *C. rugofrons,* **new species**, Volcán Colima, Colima, México; **E**, *C. tonatiuh,* **new species**, San Pedro y San Pablo Ayutla, Oaxaca, México; **F**, *C. yaqui*, **new species**, Ramsey Canyon, Huachuca Mountains, Cochise Co., Arizona, U.S.A.; **G**, *C. zacapa*, **new species**, San Lorenzo, Zacapa, Guatemala; **H**, *C. zapotec,* **new species**, El Paraiso, Guerrero, México; **I**, *C. zapotec,* **new species**, San Gabriel Mixtepec, Oaxaca, México. Scale bar = 1 mm.

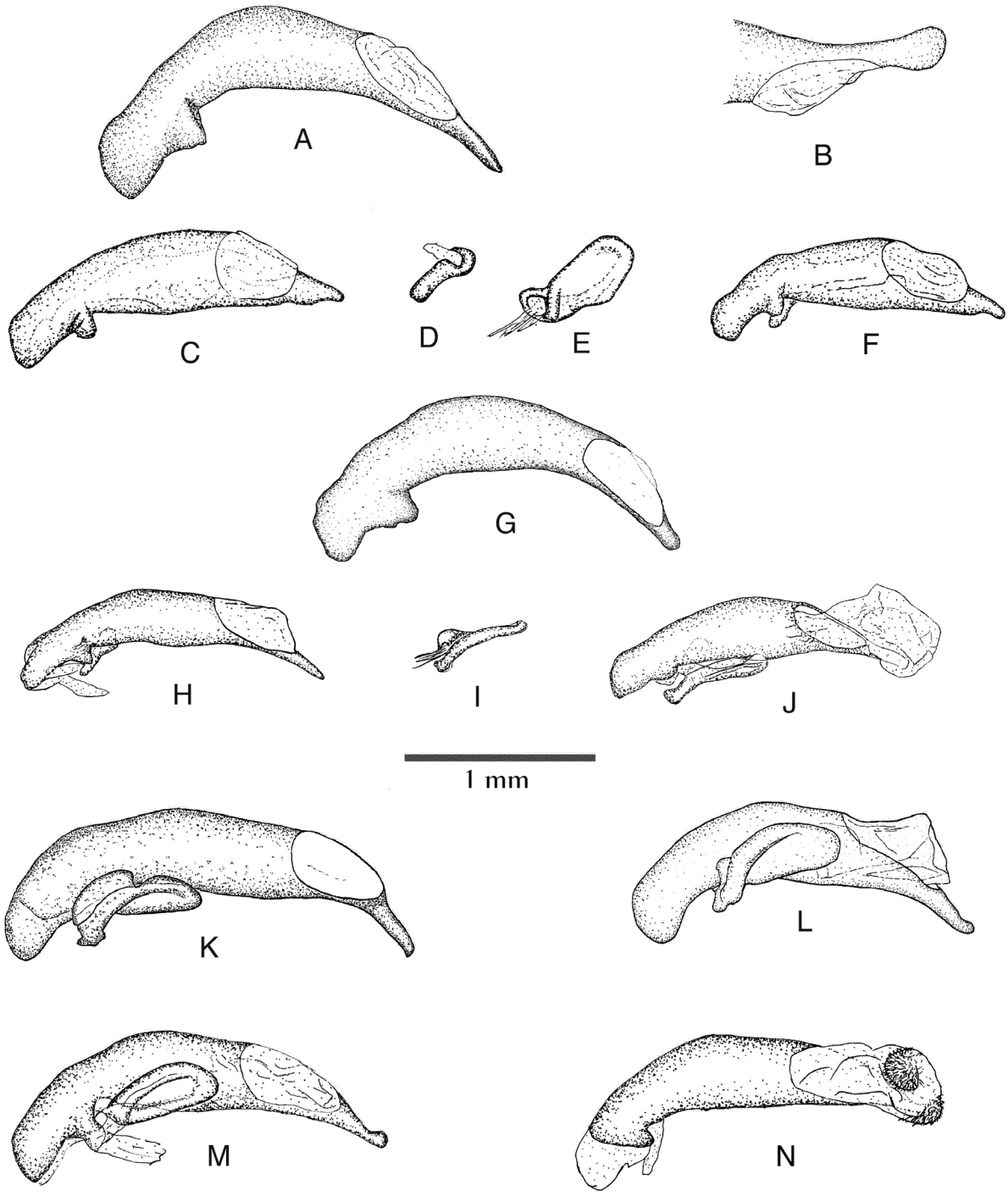


Figure 10. Line drawings of male genitalia of species of *C. (Pinacodera) latiuscula* species subgroup. **A–B**, phallus of *C. apache*, **new species**, Madera Canyon, Santa Rita Mountains, Santa Cruz Co., Arizona, U.S.A.: **A**, left lateral aspect; **B**, periostial area and preapex, dorsal aspect. **C–F**, phallus and parameres of *C. crenatoverpa*, **new species**, HOLOTYPE, Temascaltepec, state of México, México: **C**, **F**, phallus, left lateral aspect; **D**, **E**, right and left parameres respectively, ventral aspect; **F**, phallus, left lateral aspect, of *C. crenatoverpa* **new species**, El Rincón, Jalisco, México. **G**, phallus, left lateral aspect, of *C. cuyuteca,* **new species**, HOLOTYPE, Cuautla, Jalisco, México. **H-I**, phallus, **H**, left lateral aspect and **I**, left paramere, lateral aspect of *C. geminata*, **new species**, HOLOTYPE, Cuernavaca, Morelos, México. **J**, Phallus, left lateral aspect, with endophallus partially everted, of *C. geminata*, **new species**, Cuernavaca, Morelos, México. **K**, phallus, left lateral aspect, of *C. huichilobos*, **new species**, Puerto Angel, Oaxaca, México. **L–N**, phallus, left lateral aspect of *C. latiuscula* (Chaudoir): **L**, Tzucacab, Yucatán, México; **M**, Cuernavaca, Morelos, México; **N**, endophallus partially everted, showing microtrichial patches, Cuernavaca, Morelos, México. Scale bar = 1 mm.

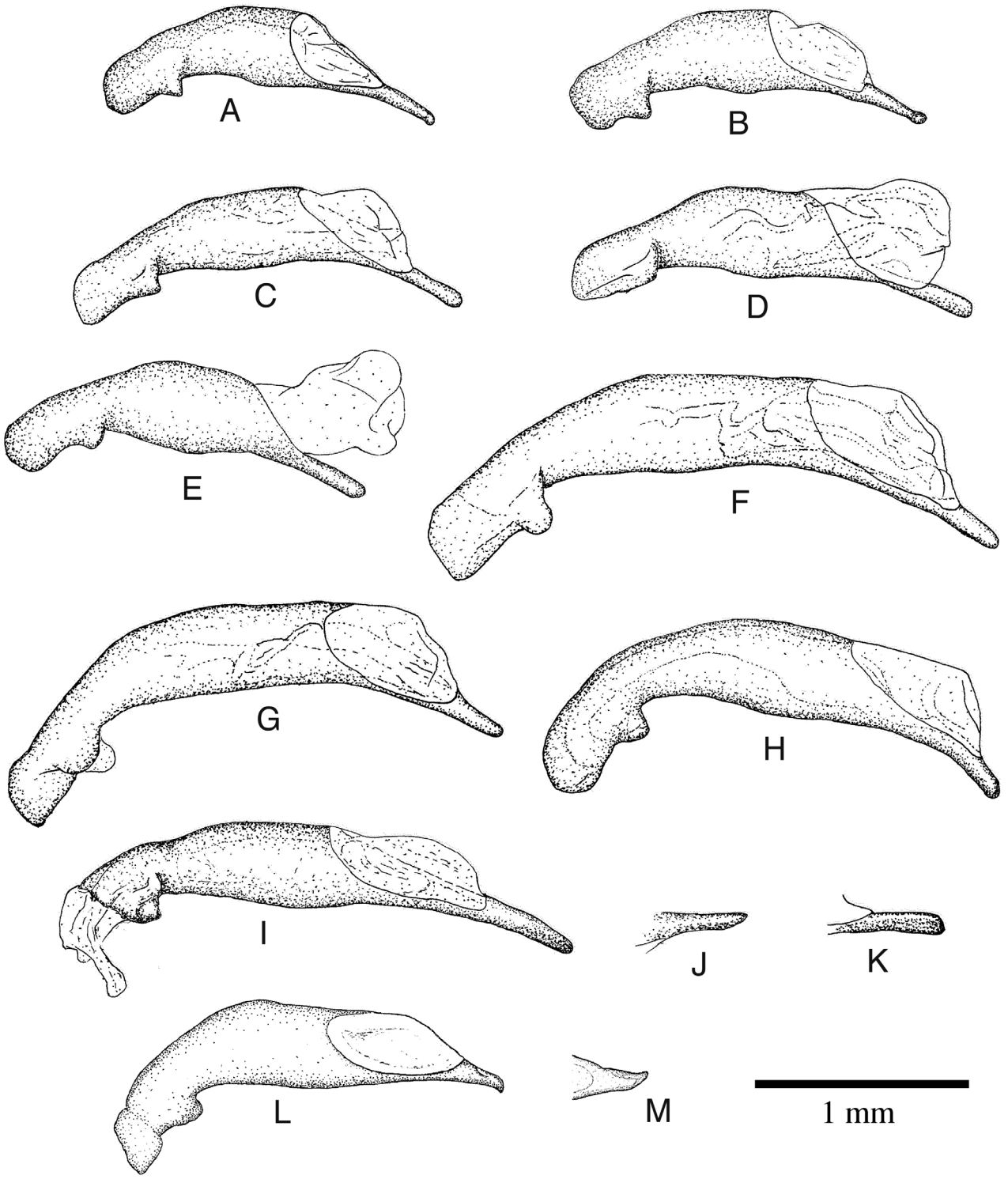


Figure 11. Line drawings of male genitalia of species of *C. (Pinacodera) latiuscula* species subgroup. **A**, **B**, phallus, left lateral aspect, of *C. punctifera punctifera* (LeConte) Madera Canyon, Santa Rita Mountains, Santa Cruz Co., Arizona, U.S.A. **C–E**, phallus, left lateral aspect, endophallus partially everted, of *C. punctifera toltec*, **new subspecies**: **C**, **D**, Cuernavaca, Morelos, México; **E**, Veracruz, México. **F**, **G**, phallus, left lateral aspect of *C. rugofrons,* **new species**. **F**, Los Volcanes, Jalisco, México; **G**, Cuautla, Jalisco, México. **H**, phallus, left lateral aspect, of *C. tonatiuh,* **new species**, Nochixtlán, Oaxaca, México. **I**, **J**, phallus of *C. yaqui*, **new species**, Sierra Vista, Cochise Co., Arizona, U.S.A.: **I**, left lateral aspect; **J**, preapex, dorso-ventral aspect. **K**, phallic preapex, dorsoventral aspect of *C. yaqui*, **new species**, Cave Creek, Cochise Co., Arizona, U.S.A. **L**, **M**, phallus of *C. zacapa,* **new species**, vic. Yuscasran, El Paraiso, Honduras: **L**, left lateral aspect; **M**, dorsal aspect. Scale bar = 1 mm.

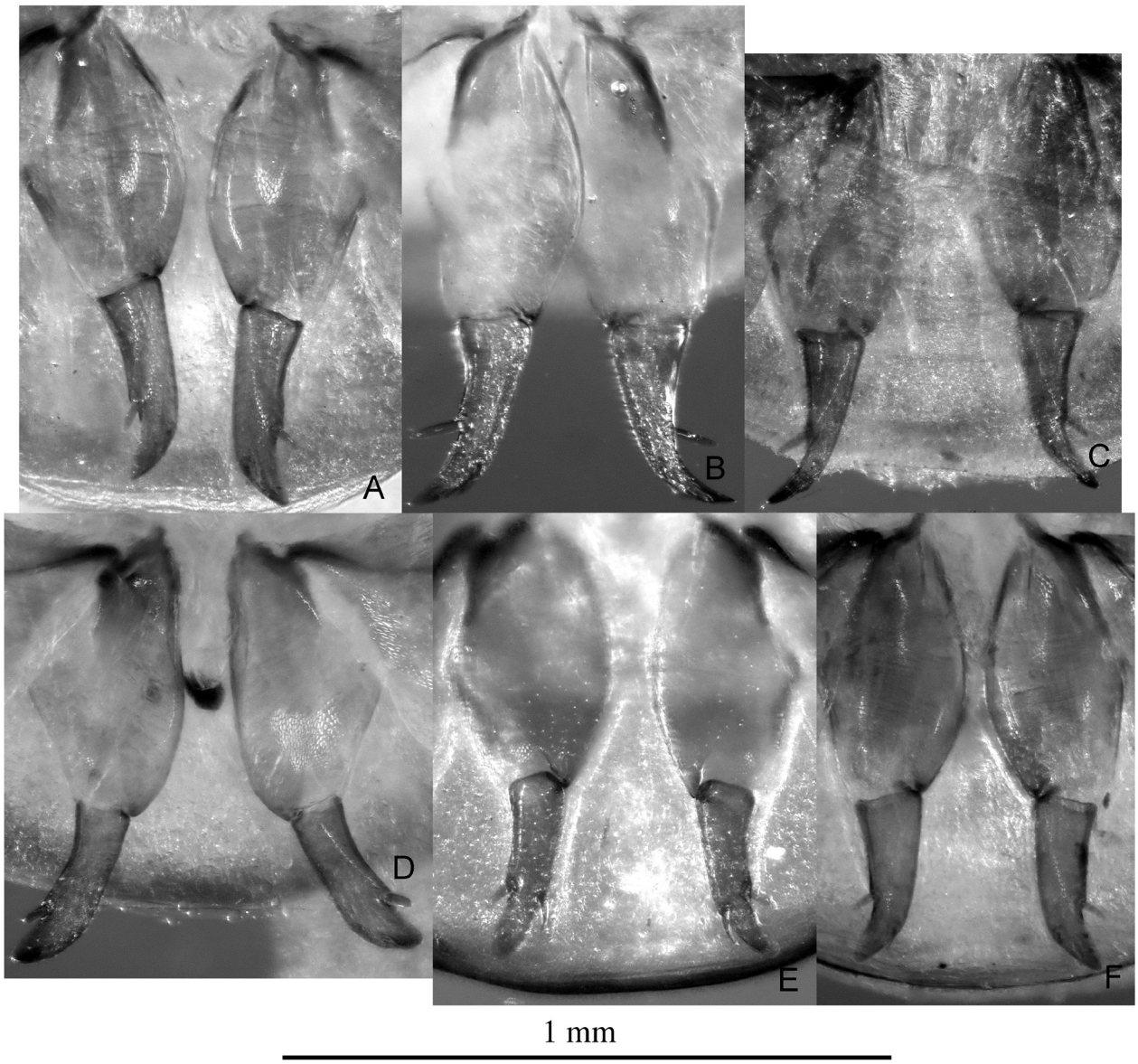


Figure 12. Automontage photographs of female genitalia (gonocoxa) of species of *C. (Pinacodera) latiuscula* species subgroup. **A**, *C. apache,* **new species**, Huachuca Mountains, Cochise Co., Arizona, U.S.A. **B**, *C. crenatoverpa,* **new species**, Volcán Ceboruca, Nayarit, México. **C**, *C. geminata,* **new species**, Tuxtla Gutiérrez, Chiapas, México. **D**, *C. huchilobos,* **new species**, Puerto Angel, Oaxaca, México. **E**, *C. latiuscula,* (Chaudoir), Runias de Kabah, Yucatán, México. **F**, *C.punctifera punctifera* (LeConte), Chiricahua Mountains, Cochise Co., Arizona, U.S.A. Scale bar = 1 mm.

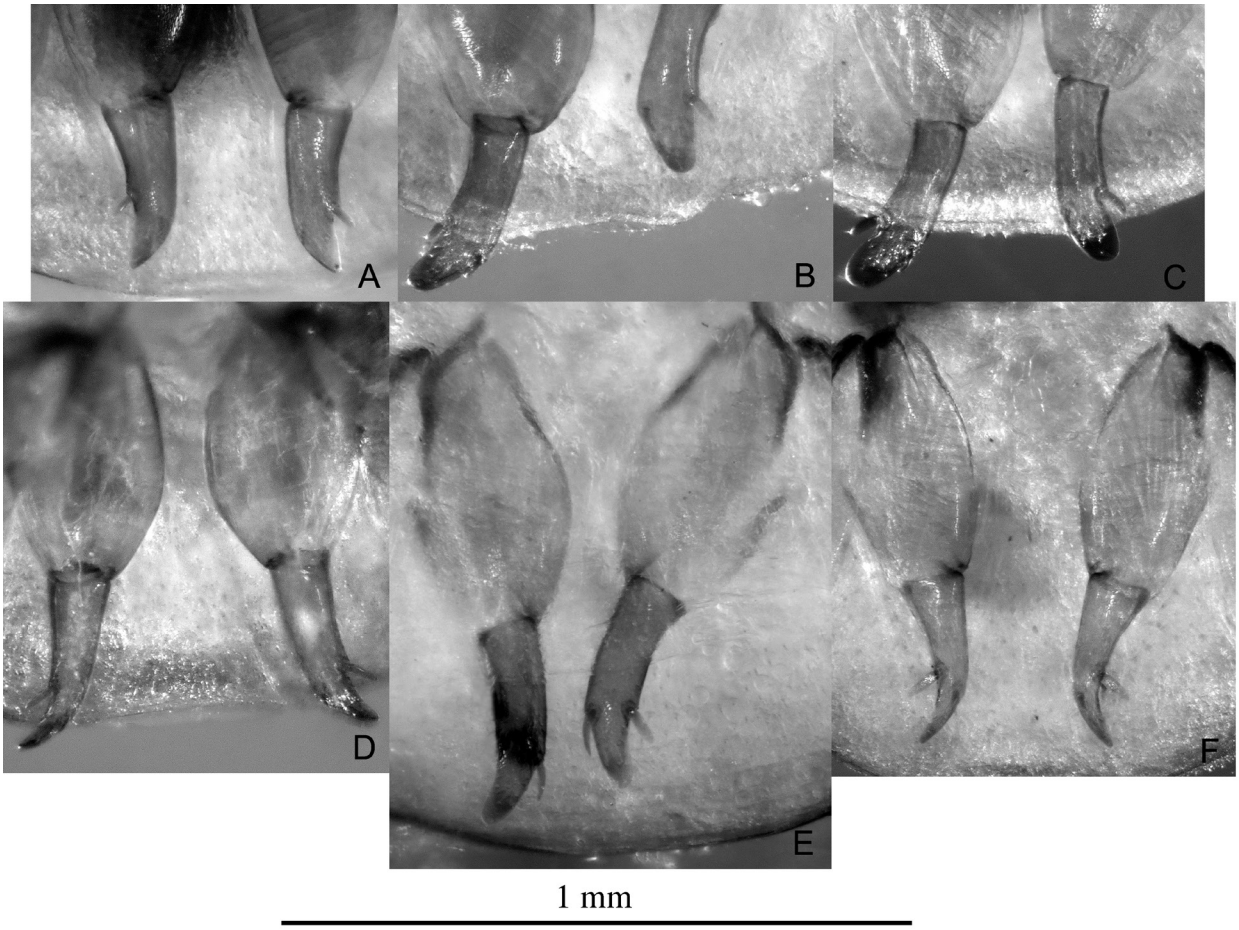


Figure 13. Automontage photographs of female genitalia (gonocoxa) of species of *C. (Pinacodera) latiuscula* species subgroup. **A**, *C. punctifera toltec,* **new subspecies**, Ixmiquilpan, Hidalgo, México. **B**, *C. rugofrons,* **new species**, Tepic, Nayarit, México. **C**, *C. tonatiuh,* **new species**, Telixlahuaca, Oaxaca, México. **D**, *C. yaqui,* **new species**, Portal, Cochise Co., Arizona, U.S.A. **E**, *C. zacapa,* **new species**, Granda Laguna, Nicaragua. **F**, *C. zapotec,* **new species**, San Gabriel Mixtepec, Oaxaca, México. Scale bar = 1 mm.

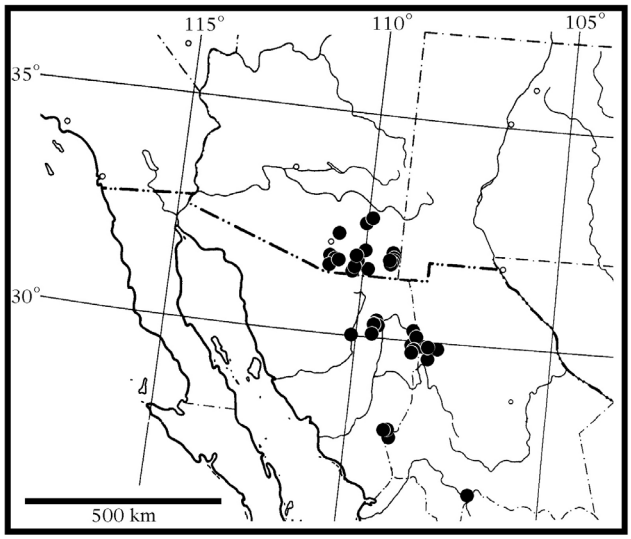


Figure 14. Outline map of southwestern United States of America and adjacent northwestern México showing positions of known localities for *Cymindis apache,* **new species**.

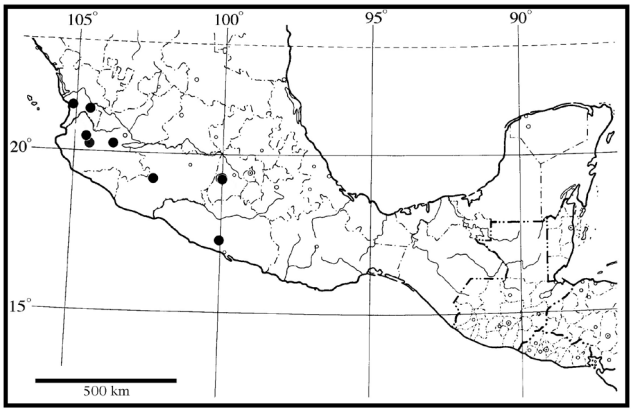


Figure 15. Outline map of southern México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis crenatoverpa,* **new species**.

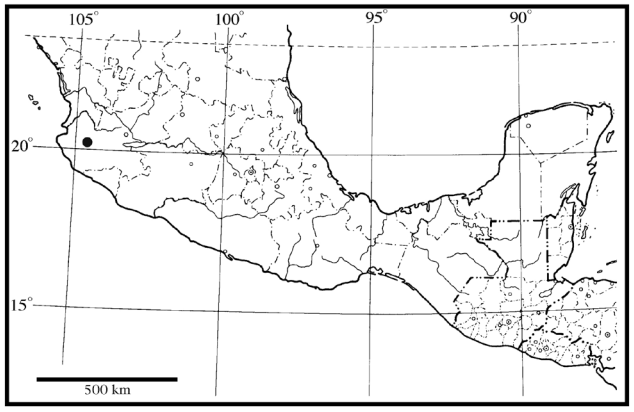


Figure 16. Outline map of southern México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis cuyuteca,* **new species**.

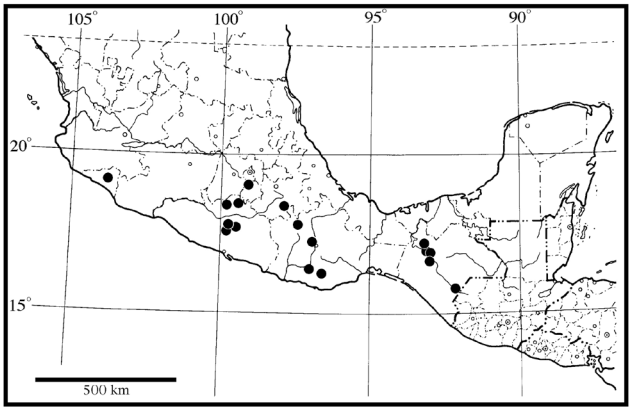


Figure 17. Outline map of southern México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis geminata,* **new species**.

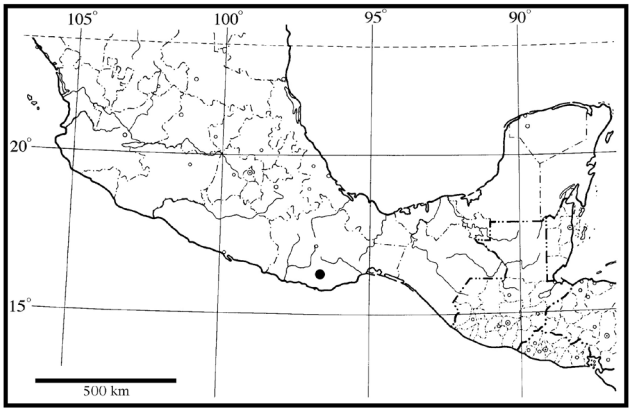


Figure 18. Outline map of southern México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis huichilobos,* **new species**.

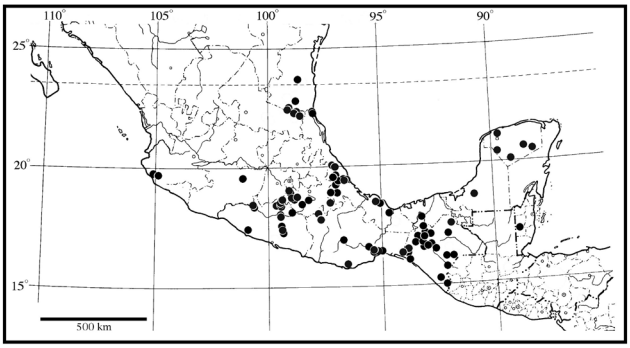


Figure 19. Outline map of México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis latiuscula* (Chaudoir).

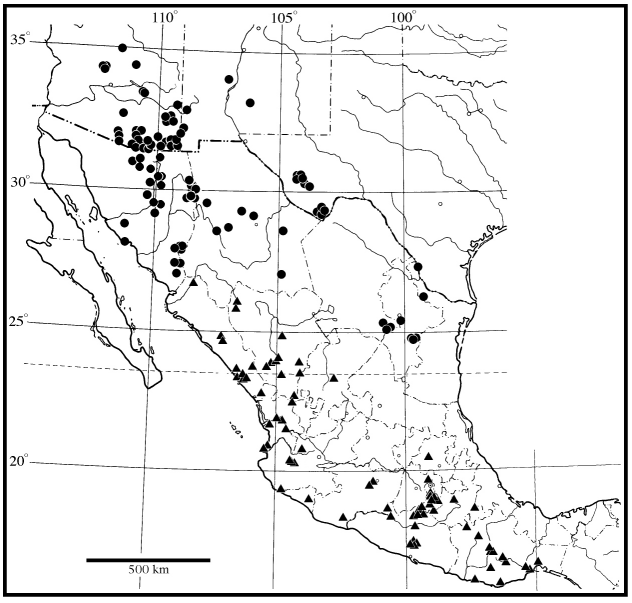


Figure 20. Outline map of southwestern United States of America and México showing positions of known localities for subspecies of *Cymindis punctifera* (LeConte): *C. p. punctifera* (LeConte) (●) and *C. p. toltec*, (▲) **new subspecies**.

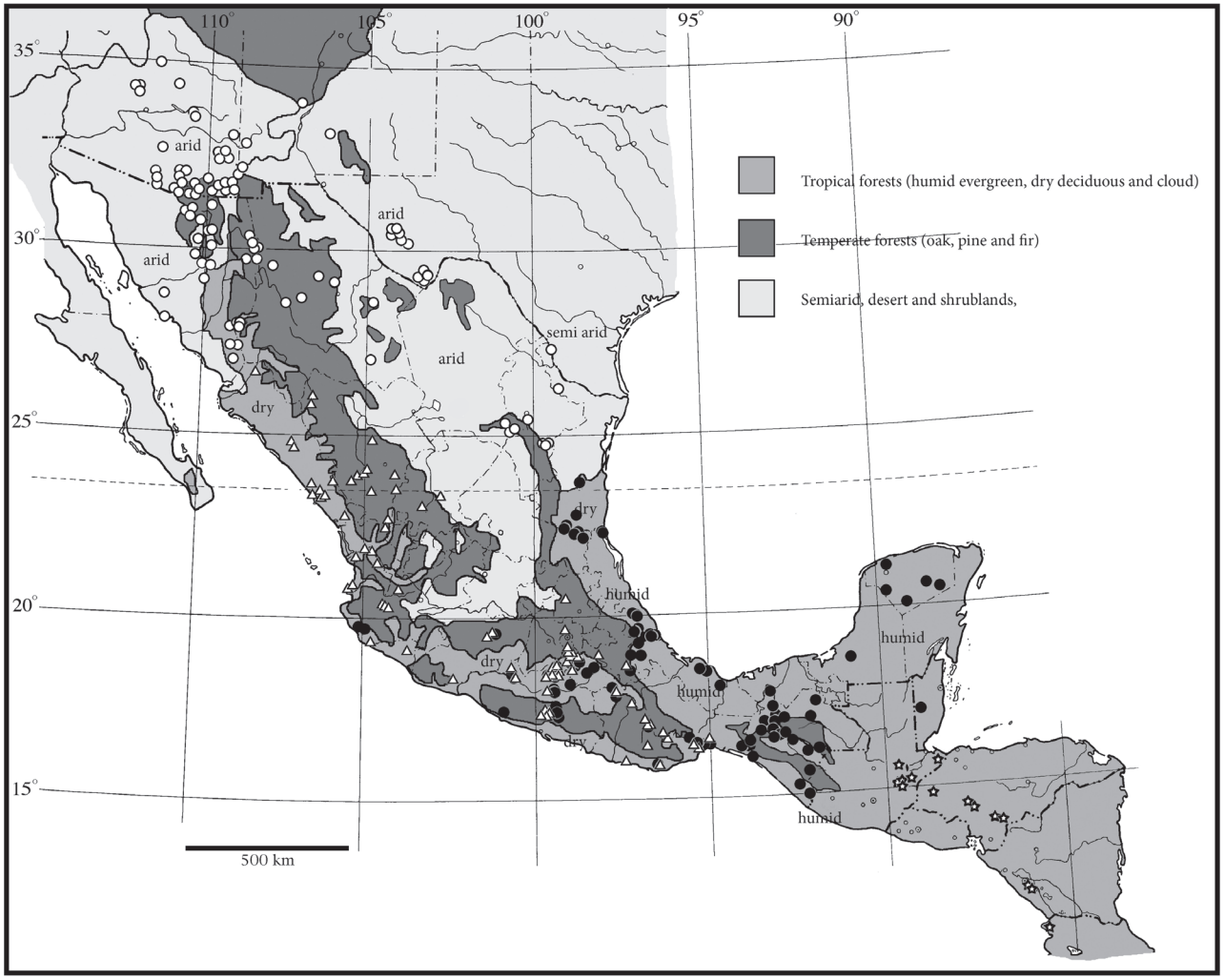


Figure 21. Outline map of southwestern United States of America, México and adjacent Nuclear Middle American republics, with an overlay of general forest types and showing positions of known localities for *Cymindis p. punctifera* (○), *C. p. toltec,* **new subspecies** (△), *C. latiuscula* (Chaudoir) (●), and *C. zacapa*, **new species** (☆).

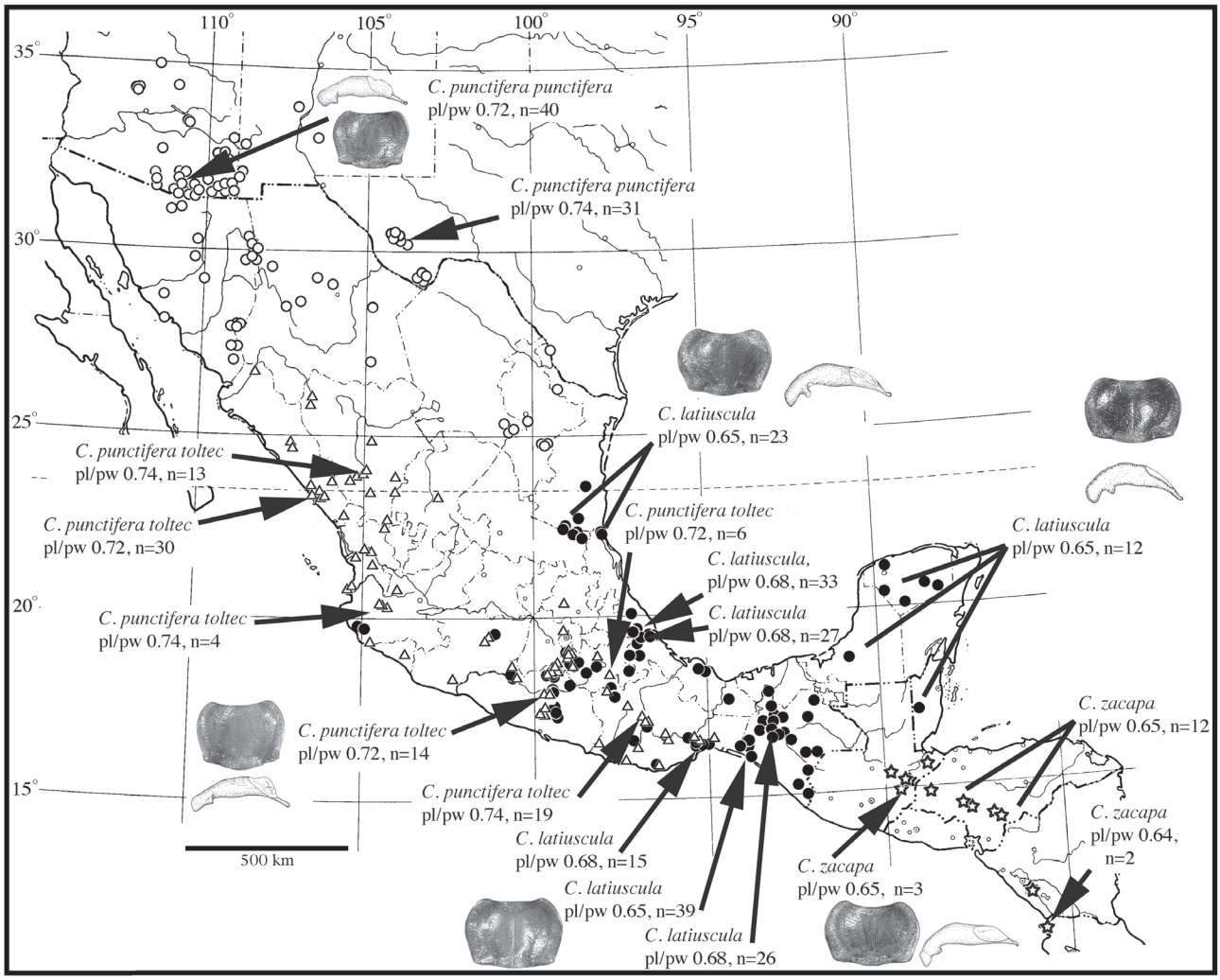


Figure 22. Outline map of southwestern United States of America, México and adjacent Nuclear Middle American republics, including representative values for the ratio PL/PW, examples of pronotal shape, and form of the phallus for specimens from representative localities of *Cymindis p. punctifera* (○), *C. p. toltec,* **new subspecies** (△), *C. latiuscula* (Chaudoir) (●), and *C. zacapa*, **new species** (☆).

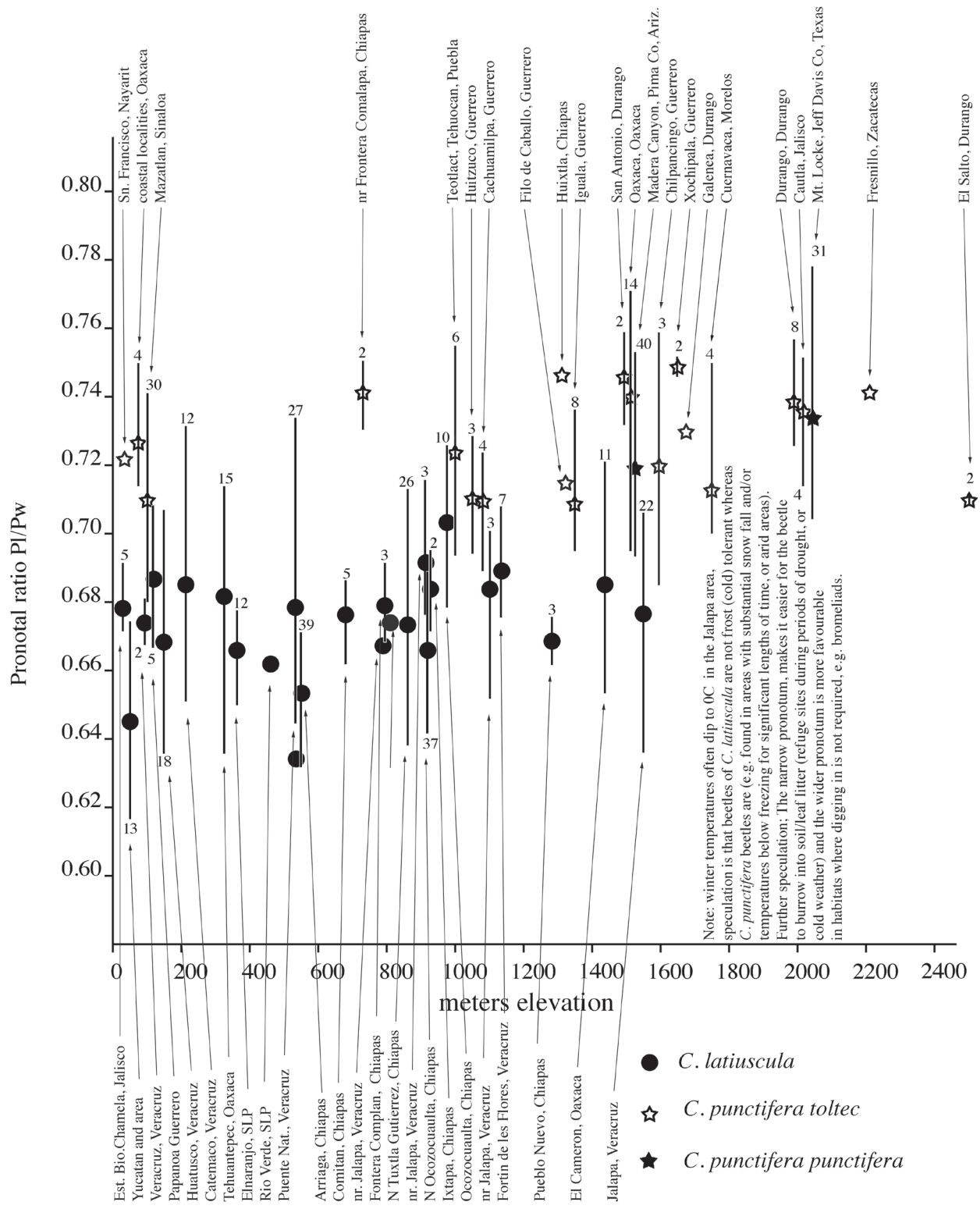


Figure 23. Graph of values for ratio PL/PW vs. elevation (m) for selected population samples of *Cymindis latiuscula* (Chaudoir) (●), *C. p. punctifera* (*LeConte*) (★), and *C. punctifera toltec,* **new subspecies** (☆).

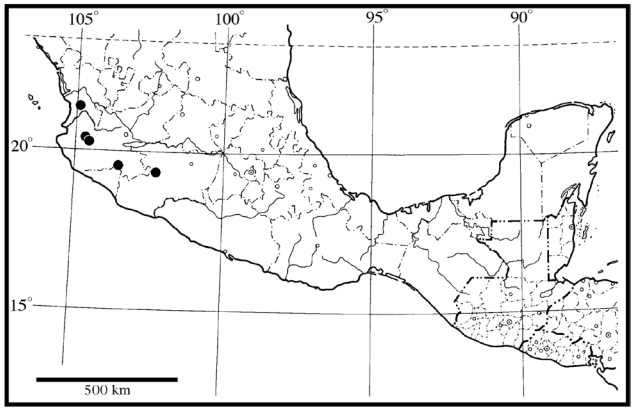


Figure 24. Outline map of southern México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis rugofrons,* **new species**.

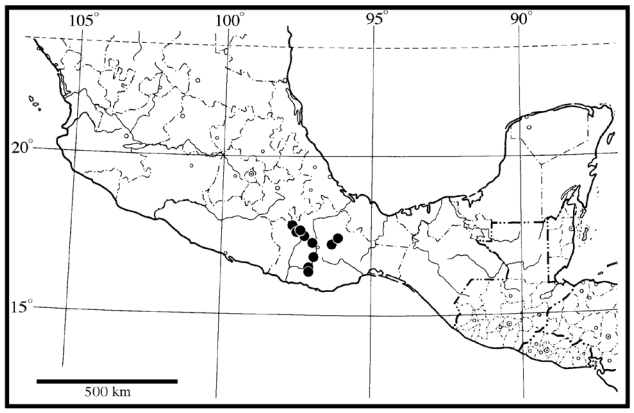


Figure 25. Outline map of southern México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis tonatiuh,* **new species**.

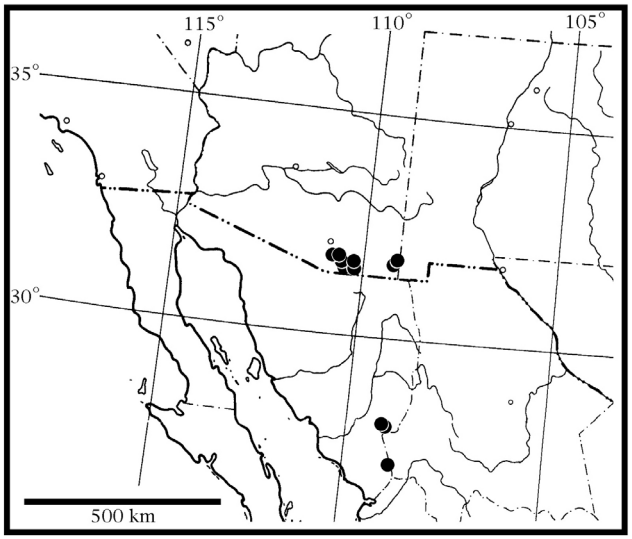


Figure 26. Outline map of southwestern United States of America and adjacent northwestern México showing positions of known localities for *Cymindis yaqui,* **new species**.

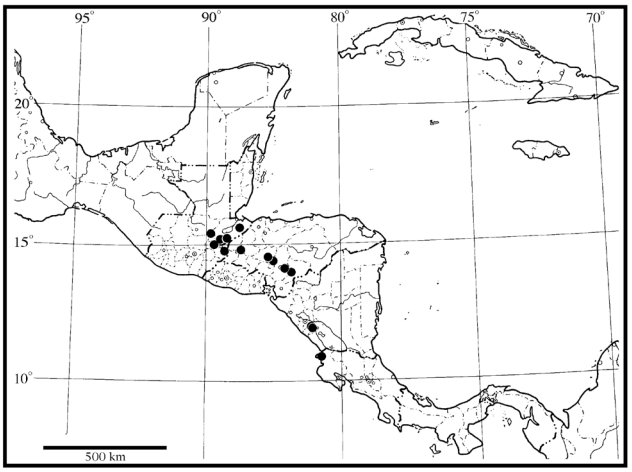


Figure 27. Outline map of southern México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis zacapa,* **new species**.

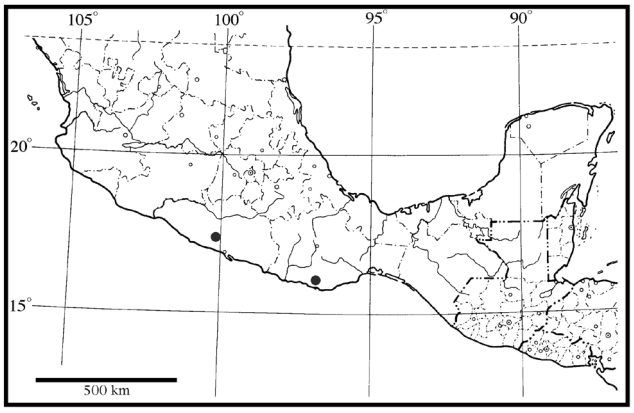


Figure 28. Outline map of southern México and adjacent Nuclear Middle American republics showing positions of known localities for *Cymindis zapotec* **new species**.

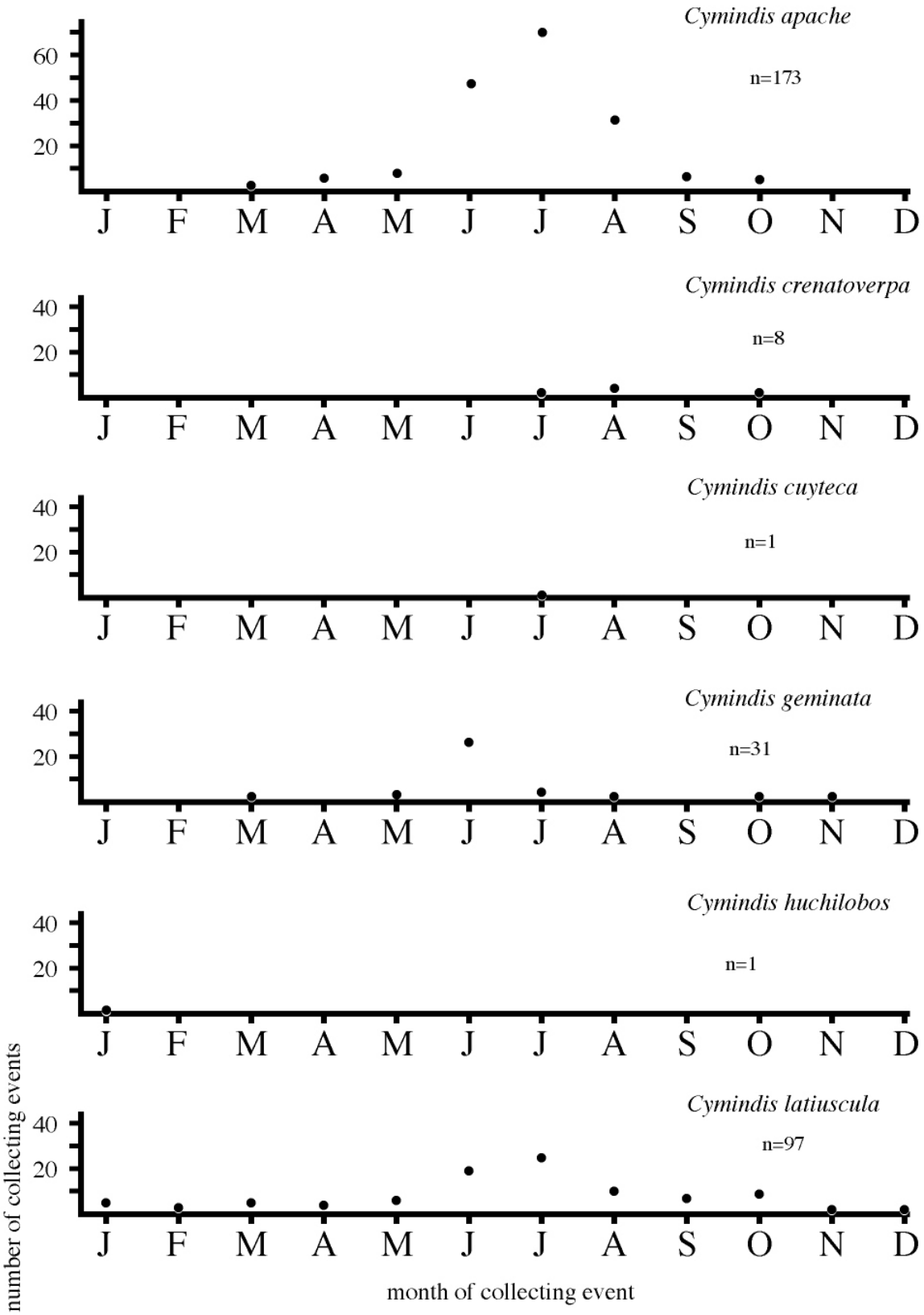


Figure 29. Graphs showing number of collecting events per month, for six species of *Cymindis* (*Pinacodera*), *latiuscula* species subgroup.

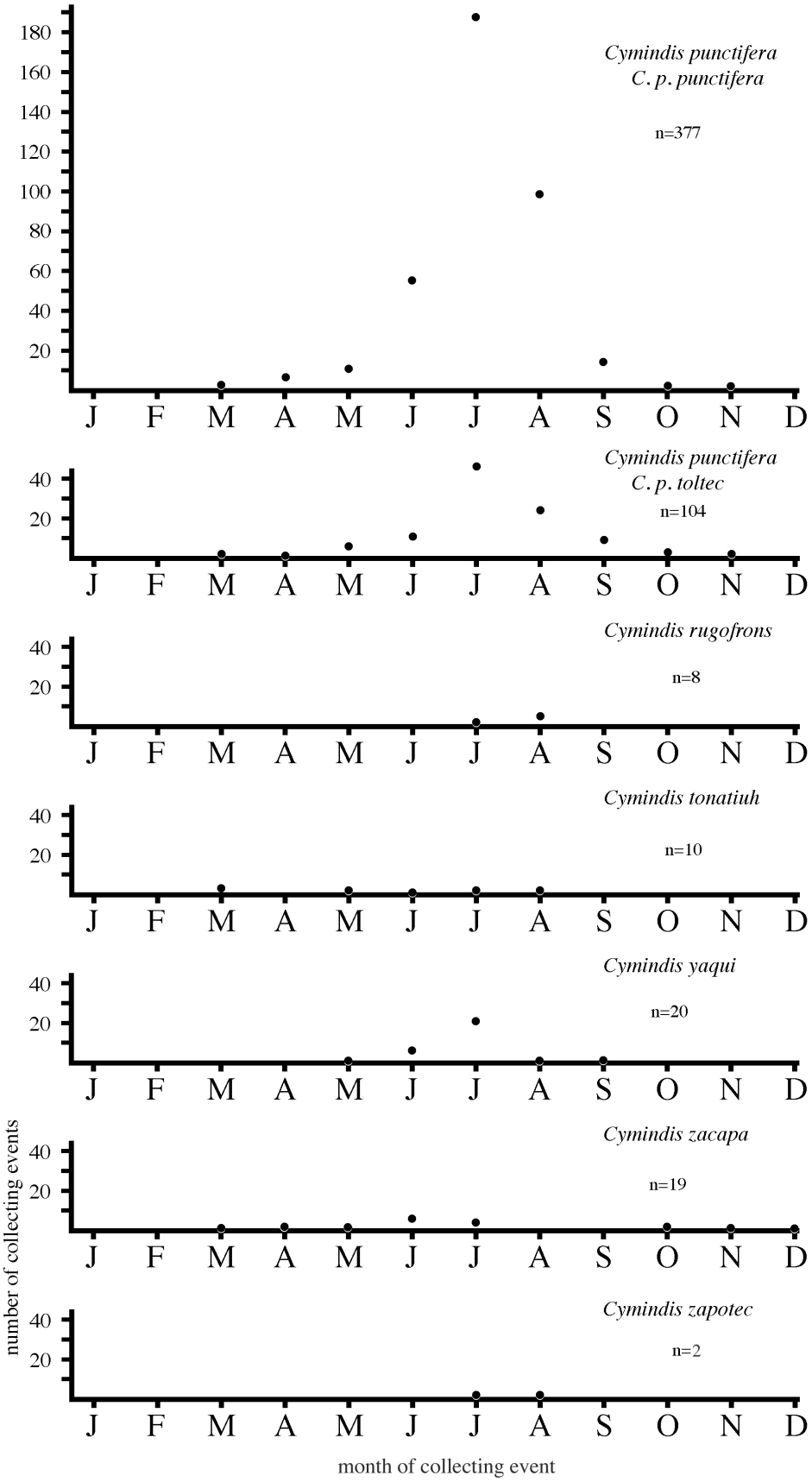


Figure 30. Graphs showing number of collecting events per month, for five species and two subspecies of *Cymindis* (*Pinacodera*), *latiuscula* species subgroup.

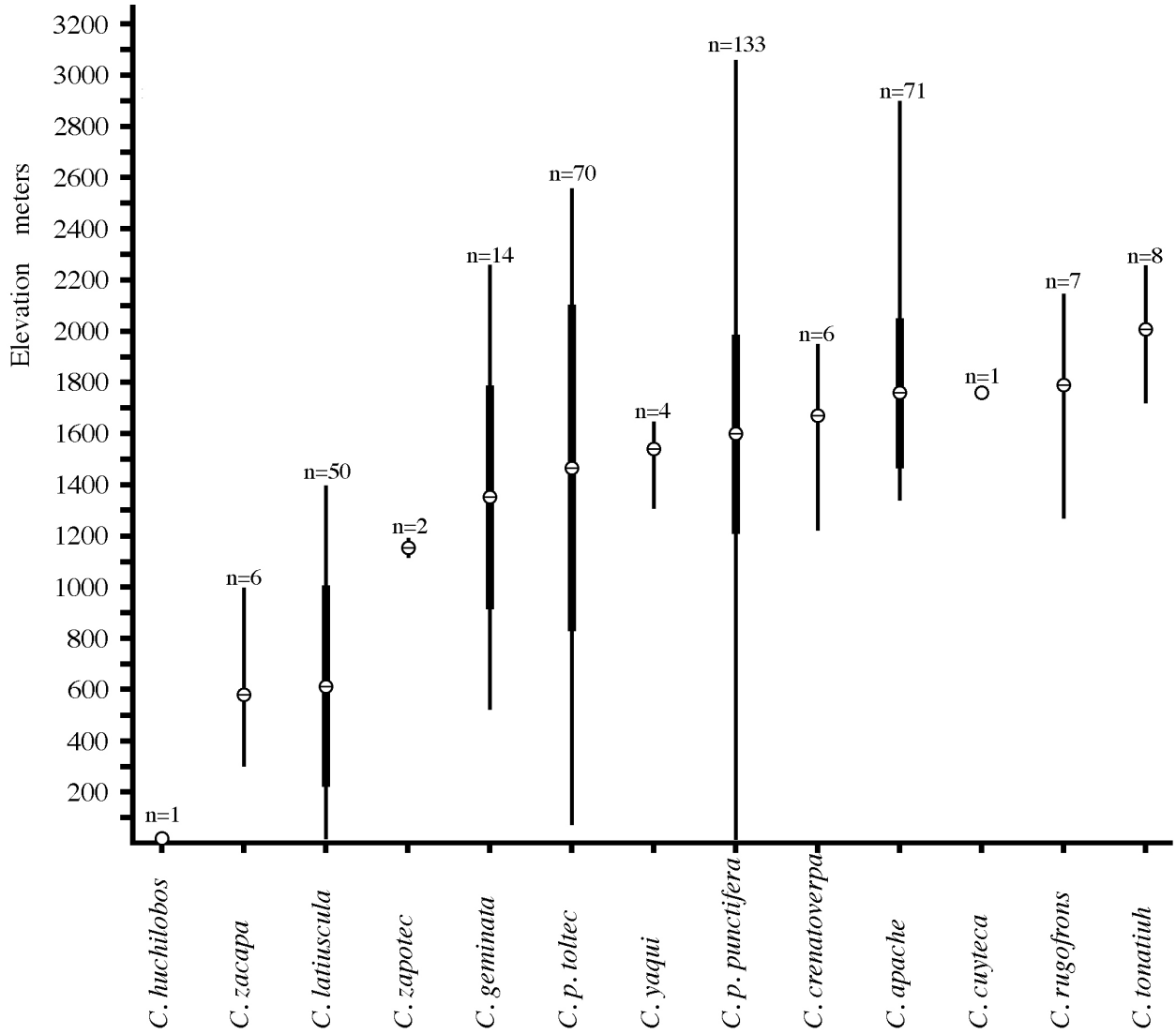


Figure 31. Distribution of species of *Cymindis* (*Pinacodera*), *latiuscula* species subgroup by elevation (m). Each point used (n) is a collecting event with elevation data recorded on the label. This does not represent the number of specimens collected on a given date or at that locality. For each taxon, the thin vertical line represents elevation range, the accompanying thick line, one standard deviation each side of mean; mean is a circle with a short horizontal bar; and a circle without horizontal bar is a single collecting event.

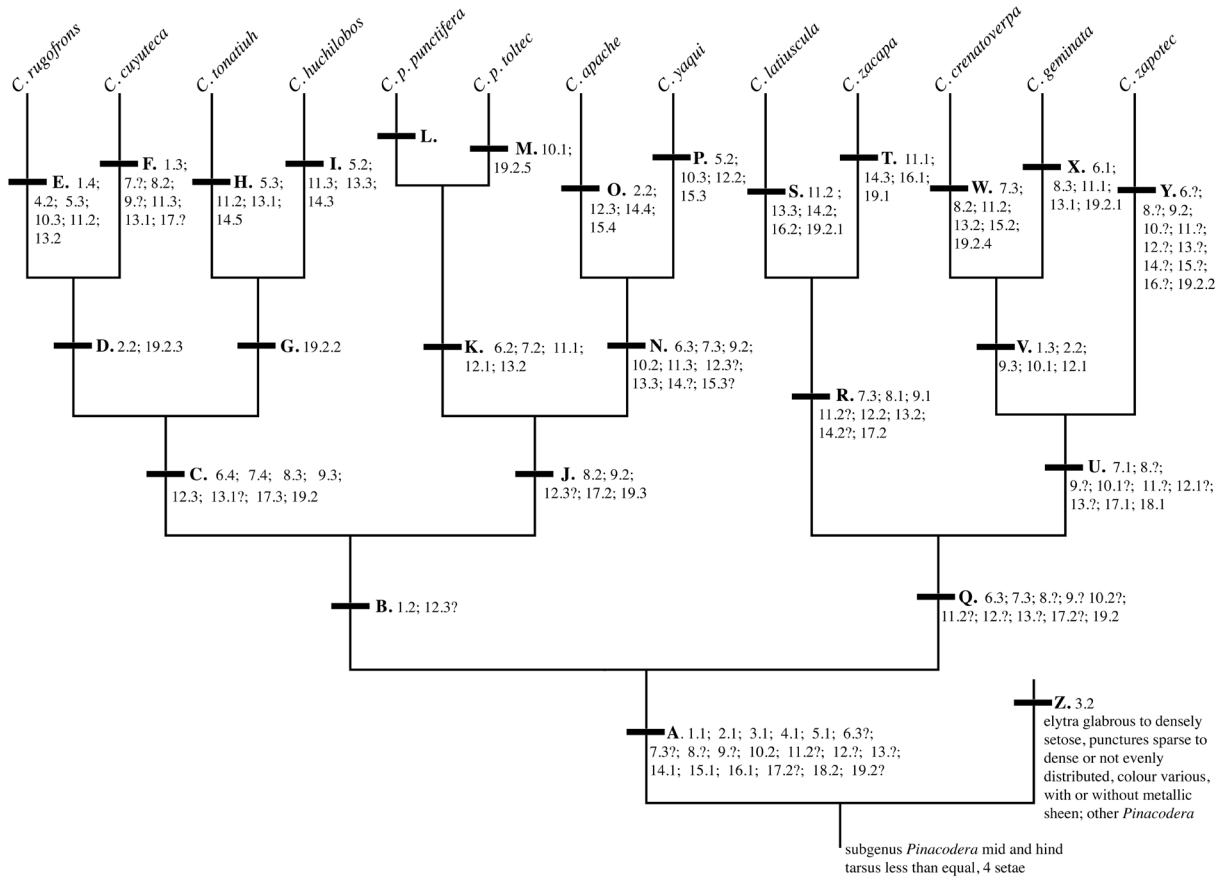


Figure 32. Reconstructed phylogeny of the taxa of the *Cymindis (Pinacodera) latiuscula* species subgroup, branches are identified by letter and character states by number (see Table 9).

Table 2. Data about variation in standardized body length (SBL, mm) for the *Cymindis latiuscula* sub- group (SE= standard error, SD=standard deviation).

Species	N	Range	Mean ± 2SE	1.5 SD
MALES				
C. rugofrons	6	8.59 - 9.61	9.23 ± 0.28	0.52
C. tonatiuh	29	8.57 - 9.29	8.83 ± 0.06	0.24
C. cuyuteca	1		8.72	
C. huichilobos	12	8.51 - 9.08	8.69 ± 0.11	0.28
C. apache	18	8.06 - 8.89	8.51 ± 0.10	0.31
C. zacapa	10	8.05 – 8.89	8.46 ± 0.16	0.38
C. yaqui	20	7.87 - 8.70	8.28 ± 0.10	0.33
C. latiuscula	42	7.18 - 8.94	8.18 ± 0.11	0.53
C. crenatoverpa	8	7.77 - 8.13	7.84 ± 0.17	0.34
C. p. toltec	12	7.10 - 8.41	7.70 ± 0.22	0.59
C. p. punctifera	20	6.55 - 7.95	7.30 ± 0.15	0.51
C. geminata	11	6.40 - 7.37	6.90 ± 0.18	0.45
FEMALES				
C. rugofrons	4	9.61 – 9.99	9.76	
C. tonatiuh	26	9.04 - 10.32	9.50 ± 0.14	0.52
C. huichilobos	5	8.70 - 9.79	9.39 ± 0.38	0.63
C. apache	30	8.12 - 9.16	8.79 ± 0.11	0.44
C. zacapa	7	7.98 - 9.09	8.75 ± 0.28	0.56
C. yaqui	5	7.79 - 9.08	8.50 ± 0.41	0.69
C. crenatoverpa	2	7.86 - 8.25	8.05	
C. latiuscula	59	7.13 - 9.29	8.15 ± 0.11	0.65
C. p. toltec	21	7.02 - 8.77	7.99 ± 0.22	0.74
C. p. punctifera	43	6.32 - 8.08	7.49 ± 0.13	0.64
C. geminata	25	6.51 - 7.76	7.19 ± 0.15	0.57
C. zapotec	2	6.80 - 7.19	6.99	

Table 3. Data about variation in the ratio PL/PW for the *Cymindis latiuscula* sub-group.

Species	N	Range	Mean
MALES			
C. geminata	11	0.73 – 0.79	0.76
C. rugofrons	6	0.71 – 0.85	0.76
C. huichilobos	12	0.73 – 0.78	0.75
C. tonatiuh	29	0.70 – 0.79	0.74
C. crenatoverpa	8	0.71 – 0.77	0.73
C. p. punctifera	42	0.69 – 0.78	0.73
C. cuyuteca	1		0.73
C. apache	18	0.67 – 0.75	0.72
C. p. toltec	46	0.68 – 0.77	0.72
C. yaqui	20	0.63 – 0.73	0.71
C. latiuscula	148	0.61 – 0.73	0.67
C. zacapa	10	0.63 – 0.68	0.65
FEMALES			
C. geminata	25	0.72 – 0.81	0.76
C. rugofrons	4	0.74 – 0.78	0.76
C. huichilobos	5	0.74 – 0.78	0.76
C. crenatoverpa	2	0.71 – 0.80	0.75
C. tonatiuh	26	0.69 – 0.77	0.74
C. p. punctifera	42	0.69 – 0.77	0.73
C. zapotec	2	0.70 – 0.74	0.72
C. p. toltec	46	0.68 – 0.77	0.72
C. yaqui	5	0.68 – 0.73	0.71
C. apache	30	0.66 – 0.74	0.70
C. latiuscula	67	0.62 – 0.72	0.67
C. zacapa	7	0.63 – 0.66	0.65

Table 4. Data about variation in total length (MLp, mm) of the phallus for males of the *Cymindis latiuscula* sub-group (SE= standard error, SD=standard deviation).

Species	N	Range	Mean ± 2SE	1.5 SD
C. rugofrons	6	2.27 – 2.59	2.46 ± 0.10	0.17
C. yaqui	20	2.16 – 2.47	2.33 ± 0.03	0.10
C. apache	18	2.07 – 2.28	2.16 ± 0.02	0.07
C. huichilobos	12	2.05 – 2.16	2.10 ± 0.02	0.05
C. tonatiuh	29	1.93 – 2.12	2.03 ± 0.02	0.07
C. cuyuteca	1		2.00	
C. zacapa	9	1.80 – 1.93	1.86 ± 0.03	0.07
C. latiuscula	42	1.67 – 2.06	1.85 ± 0.03	0.14
C. p. toltec	12	1.62 – 1.91	1.77 ± 0.05	0.13
C. crenatoverpa	8	1.56 – 1.79	1.71 ± 0.05	0.11
C. p. punctifera	14	1.46 – 1.74	1.61 ± 0.04	0.10
C. geminata	10	1.44 – 1.53	1.50 ± 0.02	0.05

Table 5. Data about variation in maximum width (MWp, mm) of the phallus for males of the *Cymindis latiuscula* sub-group (SE= standard error, SD=standard deviation).

Species	N	Range	Mean ± 2SE	1.5 SD
C. apache	18	0.38 – 0.67	0.49 ± 0.05	0.04
C. huichilobos	12	0.45 – 0.52	0.47 ± 0.01	0.04
C. yaqui	20	0.41 – 0.52	0.47 ± 0.01	0.05
C. cuyuteca	1		0.47	
C. crenatoverpa	8	0.39 – 0.54	0.43 ± 0.04	0.08
C. rugofrons	6	0.40 – 0.49	0.43 ± 0.03	0.06
C. latiuscula	42	0.35 – 0.52	0.43 ± 0.02	0.07
C. tonatiuh	29	0.38 – 0.47	0.42 ± 0.01	0.04
C. zacapa	9	0.35 – 0.45	0.39 ± 0.02	0.01
C. p. punctifera	14	0.31 – 0.40	0.36 ± 0.01	0.04
C. p. toltec	12	0.33 – 0.42	0.36 ± 0.02	0.05
C. geminata	10	0.28 – 0.35	0.32 ± 0.01	0.03

Table 6. Data about variation in displacement (MDp, mm) of the phallus for males of the *Cymindis latiuscula* species group (SE= standard error, SD=standard deviation).

Species	N	Range	Mean ± 2SE	1.5 SD
C. apache	18	0.85 – 1.04	0.95 ± 0.03	0.09
C. cuyuteca	1		0.89	
C. huichilobos	12	0.80 – 0.92	0.86 ± 0.02	0.05
C. rugofrons	6	0.80 – 0.89	0.82 ± 0.03	0.06
C. tonatiuh	29	0.73 – 0.85	0.79 ± 0.01	0.05
C. zacapa	9	0.67 – 0.78	0.71 ± 0.02	0.05
C. latiuscula	42	0.49 – 0.85	0.68 ± 0.02	0.11
C. yaqui	20	0.61 – 0.71	0.66 ± 0.01	0.04
C. p. toltec	12	0.47 – 0.71	0.57 ± 0.03	0.09
C. crenatoverpa	8	0.49 – 0.64	0.57 ± 0.03	0.07
C. p. punctifera	14	0.47 – 0.59	0.54 ± 0.02	0.05
C. geminata	10	0.45 – 0.52	0.49 ± 0.02	0.04

Table 7. Data about variation in preapex length (DPp, mm) of the phallus for males of the *Cymindis latiuscula* subgroup (SE= standard error, SD= standard deviation).

Species	N	Range	Mean ± 2SE	1.5 SD
C. yaqui	20	0.34 – 0.42	0.39 ± 0.01	0.04
C. apache	18	0.31 – 0.42	0.37 ± 0.01	0.05
C. huichilobos	12	0.28 – 0.35	0.31 ± 0.01	0.04
C. p. punctifera	14	0.21 – 0.28	0.25 ± 0.01	0.03
C. p. toltec	12	0.20 – 0.31	0.25 ± 0.02	0.04
C. rugofrons	6	0.21 – 0.28	0.24 ± 0.02	0.04
C. crenatoverpa	8	0.21 – 0.28	0.23 ± 0.02	0.03
C. latiuscula	42	0.15 – 0.28	0.23 ± 0.01	0.04
C. zacapa	9	0.19 – 0.26	0.22 ± 0.02	0.04
C. tonatiuh	29	0.14 – 0.20	0.17 ± 0.01	0.02
C. cuyuteca	1		0.17	
C. geminata	10	0.14 – 0.19	0.16 ± 0.01	0.02

Table 8. Areas of precinction: **AZ**, Arizona; **CGH**, Chiapan-Guatemalan Highlands; **OCC,** Sierra Madre Occidental, including southern part, and excluding Central Plateau; **ORI**, Sierra Madre Oriental; **SD**, Sonoran Desert; **SUR,** Sierra Madre del Sur; **TAL**, Talamancan Cordillera; **TRAN**, Sierra Transvolcanica.

many collection records within area

limited occurrence within area

TAXA	AREAS OF PRECINCTION								
	SOUTH & EASTERN GROUP		SOUTH CENTRAL GROUP		NORTH & WESTERN GROUP				
	TAL	CGH	SUR	TRAN	ORI	OCC	SD	AZ	TOTAL AREAS/TAXON
C. zacapa									2
C. latiuscula									4
C. geminata									3
C. huichilobos									1
C. tonatiuh									1
C. zapotec									1
C. crenatoverpa									3
C. cuyuteca									1
C. rugofrons									1
C. p. toltec									4
C. p. punctifera									4
C. yaqui									3
C. apache									3
TOTAL TAXA/AREA	1	3	7	6	2	5	4	3	
PRECINCTIVE TAXA/AREA	0	0	3	2	0	0	0	0	

Table 9. Phylogeny, character states.

location and character	code	character state	notes, example figures
head, sculpture	01.1	frons smooth; vertex with few punctures	Fig. 4D
	01.2	frons with few punctures; vertex with 2-3 rows of punctures	Figs. 5B, 5C
	01.3	frons with scattered punctures; vertex "strongly punctured"	Fig. 4A, 5E
	01.4	frons rugose, vertex deeply punctured	Figs. 4B, 5F
pronotum, punctation	02.1	fine	Fig. 9B
	02.2	coarse	Fig. 8D
elytra, punctation	03.1	densely evenly punctate, and setose	*latiuscula* group only
	03.2	punctation and setae uneven	other *Pinacodera*
abdomen, sternum VII, number of fixed setae	04.1	four	Fig. 2D
	04.2	six	Fig. 2E
elytron, apical angle	05.1	rounded	Fig. 2G
	05.2	angulate	Fig. 2H
	05.3	sinuate-angulate	Fig. 2F
standardized body length (SBL), mean values, males	06.1	6.4-7.7 mm	
	06.2	7.75-7.9 mm	
	06.3	8.0-8.7 mm	
	06.4	8.8-9.6 mm	
standardized body length (SBL), mean values, females	07.1	6.8-7.35 mm	
	07.2	7.4-8.25 mm	
	07.3	8.3-9.0 mm	
	07.4	9.05-10.3 mm	
pronotal length/width (PL/PW), mean values, males	08.1	0.65-0.69	Figs. 8G, 9G
	08.2	0.70-0.73	Figs. 8A, B, 9A, B, F
	08.3	0.74-0.76	Figs. 8D, E, 9D, E, H
PL/PW, mean values, females	09.1	0.65-0.69	Figs. 8G, 9G
	09.2	0.70-0.73	Figs. 8A, B, 9A, B, F
	09.3	0.74-0.76	Figs. 8D, E, 9D, E, H
phallus, maximum length, mean values	10.1	1.40-1.80 mm	
	10.2	1.81-2.20 mm	
	10.3	2.21-2.60 mm	
phallus, maximum width, mean values	11.1	0.28-0.40 mm	
	11.2	0.41-0.45 mm	
	11.3	0.46-0.67 mm	
phallus, maximum displacement, mean values	12.1	0.45-0.60 mm	
	12.2	0.61-0.74 mm	
	12.3	0.75-1.00 mm	
phallus, length of preapex, mean values	13.1	0.14-0.20 mm	

	13.2	0.21-0.28 mm	
	13.3	0.29-0.42 mm	
phallus, form of tip	14.1	evenly rounded	Figs. 10G, 11D
	14.2	bent	Fig. 10M
	14.3	hooked	Figs. 10H, 11L
	14.4	broad	Figs.10A, 11K
	14.5	clubbed	Figs. 11A, B
phallus, preapex	15.1	unmodified, i.e., round ±	Figs.11A - D
	15.2	notched	Figs.10C, F
	15.3	flattened	Fig.11K
	15.4	spatulate	Fig. 10B
endophallus, armature	16.1	without microspine patch	Figs. 10J, L, 11D, E
	16.2	with microspine patches	Fig. 10N
gonocoxite 2, form of apex	17.1	blunted	Figs. 12D, 13B, C
	17.2	sharp	Figs. 12A, E, F, 13A, E
	17.3	scythe like	Figs. 12B, C, 13F
gonocoxite 2, form of shaft	18.1	sub-parallel, stout	Figs. 12A, D-F, 13A-E
	18.2	tapered	Figs. 12B, C, 13F
geographical areas (distribution)	19.1	South and eastern: Talamancan Cordillera, Chiapan-Guatemalan	Fig. 27
	19.2	South-central	
	19.2.1	South central, eastern: Chiapan-Guatemalan, Sierra Madre del Sur, Sierra Transvolcanica	Figs. 17, 19
	19.2.2	South central: Sierra Madre del Sur	Figs. 18, 25, 28
	19.2.4	South central: Sierra Madre del Sur, Sierra Transvolcanica, Sierra Madre Occidental	
	19.2.5	South central: Sierra madre del Sur, Sierra Transvolcanica, Sierra Madre Occidental, Sonoran	Fig. 20 (part)
	19.3	North and western: S. M. Occidental + Sonoran desert + Arizona mountains	Figs 14, 20 (part), 26

Dugesiana 31(1): 75-92
Fecha de publicación: 19 enero 2024

ISSN 1405-4094 (edición impresa)
ISSN 2007-9133 (edición online)
Artículo
http://zoobank.org/A8F164E7-6A1D-4781-8036-22478B73A807

Insect fauna of Rancho Las Playitas, Municipalities of Arizpe and Bacoachi, Sonora, Mexico, and discussion of noteworthy species

La fauna de insectos y discusión de algunas especies de interés del Rancho Las Playitas, Municipios de Arizpe y Bacoachi, Sonora, México

Thomas R. Van Devender[1], John D. Palting[2], Richard A. Bailowitz[3], Douglas Danforth[4], Danny Shpeley[5] , Shawn M. Clark[6], Guillermo Molina-Padilla[7], Ana Carolina Thomson-Martínez[8], Robert A. Johnson[9], and José Abel Salazar-Martínez[10]

[1]Greater Good Charities, 236 S. Scott Ave., Suite 140, Tucson, Arizona 85701, USA; email: yecora4@comcast.net; [2]7339 N. Yucca Via, Tucson, Arizona 85704, USA; email: john.palting@roche.com; [3]5444 N. Indian Trail, Tucson, Arizona 85750, USA; email: rbailowitz@gmail.com; [4]Box 232, Bisbee, Arizona 85603, USA; email: dougofbis@gmail.com; [5]216 Humberstone Road N.W., Edmonton, Alberta, Canada T6G 2E3 Canada; email: dannyshpeley@gmail.com; [6]Monte L. Bean Life Science Museum, Brigham Young University, 645 East 1430 North Provo, Utah 84602, USA; email: shawn_clark@byu.edu; [7]Av. Juárez No. 14, Cananea, Sonora, México; email: guimopa@hotmail.com; [8]Universidad de Sonora, Avenida Luis Donaldo Colosio s/n Edificio 7H, Centro, 83000 Hermosillo, Sonora, México; email: carothomsonmtz@gmail.com; [9]School of Life Sciences, Arizona State University, Tempe, Arizona 85282, USA: email: Robert.Johnson4@asu.edu; [10]Calle 5 de Mayo s/n, Bacoachi, Sonora, México: email: joseabelsm2000@gmail.com

ABSTRACT

A total of 406 species in 313 genera, 70 families, and 11 orders of insects is documented from the Rancho Las Playitas area, Municipalities of Arizpe and Bacoachi, Sonora, Mexico. Distributions and locality records of selected noteworthy species are presented.

Key Words: Biogeography**,** insect fauna, Sonora

RESUMEN

Se documentan un total de 406 especies en 313 géneros, 70 familias y 11 órdenes de insectos en el área del Rancho Las Playitas en los municipios de Arizpe y Bacoachi, Sonora, México. Se incluyen localidades y distribución de algunas especies notables.

Palabras Clave: Biogeografía, fauna de insectos, Sonora

The northern limits of the New World tropics are in Sonora with tropical deciduous forest occurring as far north as the Sierra San Javier (26°N) and foothills thornscrub as far north as Arizpe (30.4°N) where it merges into desert grassland (Fig. 2) about 70-120 km south of the Arizona border (Van Devender and Reina-Guerrero, 2021) – the transition from the Neotropics into the North Temperate zone.

Plant diversity in Sonora is greatest in tropical deciduous forest in southern Sonora (Van Devender *et al.* 2000) and pine-oak forest in the Sierra Madre Occidental in eastern Sonora (Van Devender and Reina-Guerrero, 2016) with additional species found in temperate desert grassland to the north, woodlands and forests in the Sky Island Mountain ranges in the Madrean Archipelago in the northeast, and the Sonoran Desert to the west. Similar patterns of diversity in Sonora are seen for amphibians and reptiles (Lemos-Espinal *et al.* 2019), birds (Villaseñor-Gómez *et al.* 2010), and mammals (Castillo-Gámez *et al.* 2010). Species diversity in the insects, the largest group of Sonoran animals, is poorly known, but the pattern is likely similar to those seen in plants and vertebrates.

Shpeley and Van Devender (2022) summarized the Carabidae of Sonora. Atkinson (2019) presented the Platypodinae and Scolytinae (Curculionidae) of Sonora. Johnson (2018) provided a checklist of the Elateridae of Sonora. Bailowitz *et al*. (2017) published an annotated checklist of the butterflies of Sonora. The Odonata of Sonora were included in the book A Field Guide to the Damselflies & Dragonflies of Arizona and Sonora (Bailowitz *et al*. 2015). Alatorre-Bracamontes and Vásquez-Bolaños (2010) summarized the distributions of 290 species of ants in five states in northern Mexico, including Sonora.

Records of individual insect groups have been reported from tropical deciduous forest in the Sierra San Javier, Sonora, including Cerambycidae (Noguera *et al*. 2009), Chrysomelidae (Rodríguez-Mirón *et al*. 2021), and Odonata (González-Soriano *et al*. 2009) as well as Cantharidae, Lampyridae, Lycidae, Phengodidae, and Telegeusidae (Zaragoza-Caballero and Ramírez-García, 2009). Sánchez-Piñero and Aalbu (2002) summarized the records of Tenebrionidae from islands in the Gulf of California and the Pacific Ocean in Sonora and Baja California.

The only mixed insect fauna published for Sonora was based on specimens in ancient packrat (*Neotoma*) middens from the Sierra Bacha on the coast of the Gulf of California in the Central Gulf Coast subdivision of the Sonoran Desert (Van Devender and Hall, 1994). Arthropods (mostly insects) were identified in 42 families, 54 genera, and 37 species in 11 middens radiocarbon dated from 9,970 yr B.P. to modern. Ants and beetles were the most common specimens in the samples.

Here we report insects from the Rancho Las Playitas area near Bacoachi, Sonora (Fig. 1) to further document the species diversity of Sonora.

MATERIAL AND METHODS

Rancho Las Playitas has been in the Salazar family for four generations. It is located between Bacoachi and Bacanuchi (center: 30.598°N 110.094°W), 33 km north-northeast of Arizpe (30.4°N), and 50 km south-southeast of Cananea (31.0°N; Fig. 2). The ranch drains into the Río Sonora on the east and the Río Bacanuchi on the west. The ranch covers an area of 3,230 hectares in the municipalities of Arizpe and Bacoachi. It ranges from 1,060 to 1,590 m elevation with even higher elevations in the dramatic 1,650-m Cerro El Picacho in the center (Fig. 1).

The vegetation of Rancho Las Playitas is a foothills thornscrub-desert grassland transition. On rocky slopes, the shrubs *Lysiloma watsonii* (feather tree/*tepeguaje*), *Prosopis velutina* (velvet mesquite)*, Mimosa dysocarpa* (velvetpod mimosa/*gatuño*)*,* and *Fouquieria splendens* (ocotillo) are dominant (Van Devender *et al*. 2022). In areas with gentler slopes, the perennial grasses *Bouteloua chondrosioides, B. curtipendula,* and *B. repens* (sprucetop, sideoats, and hairy grama) are dominant. Rocky canyons with permanent water and riparian plants are scattered around the ranch, including Arroyo Padercitas, a deep narrow canyon with a perennial stream shaded by *Populus monticola* (Sonoran cottonwood/*huérigo*) trees. Van Devender *et al*. (2023) summarized the flora of the Rancho Las Playitas area. Turner *et al.* (2022) summarized the amphibians and reptiles for Rancho Las Playitas.

The Madrean Discovery Expeditions program at Greater Good Charities was first associated with Rancho Las Playitas in 2018 when Molina-Padilla and Salazar-Martínez maintained a network of wildlife cameras to document the mammal fauna. In 2019-2020, Salazar-Martínez photographed the animals, including insects, that he observed during general ranching activities on Rancho Las Playitas as part of a Madrean Discovery Expeditions Scholarship. Insects were inventoried extensively on Madrean Discovery Expeditions to Rancho Las Playitas on July 5-7, 2019, September 27 to October 5, 2021, April 18-23, 2022, and October 27-31, 2023. Additional observations and images were made on biweekly trips from October 2021 to August 2022 to monitor Rock Horned Lizards (*Phrynosoma ditmarsi*) fitted with radio transmitters (Turner *et al*. 2022).

Insects were collected with insect nets, dip nets in aquatic habitats, by hand under rocks in the daytime, at ultraviolet light at night, etc. Pitfall traps were not used. Most of the insects were collected near the Rancho Las Playitas headquarters (30.598°N 110.094°W) in the Municipality of Bacoachi and at Aguaje el Palmillalito (30.560°N 110.161°W), Arroyo las Padercitas (30.576°N 110.129°W), and Barranco Basaitequi (30.582°N 110.120°W) in the Municipality of Arizpe, with additional observations and images from throughout the study area. Field activities were supported under SEMARNAT permits to Dr. Alejandro Zaldivar-Riverón.

Specimens or photographs were identified by the authors or by specialists, including Robert A. Behrstock (Acrididae, Bombyliidae), Margarethe Brummermann (general), Nico Franz (Curculionidae), Heidi Hopkins (Nyctiboridae), Paul J. Johnson (Elateridae), Joshua R. Jones (Neuroptera), M. Andrew Johnston (Tenebrionidae), Stephen W. Lingafelter (Cerambycidae), John D. Pinto (Meloidae), Allen F. Sanborn (Cicadidae), Justin O. Schmidt (Hymenoptera), William B. Warner (Scarabaeidae), and Richard L. Westcott (Buprestidae). All Hemiptera, Hymenoptera, butterflies, and Odonata, as well as identified specimens in other groups, including Carabidae, Chrysomelidae, Formicidae, Scarabaeidae, etc. were deposited into the Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México. Unidentified specimens were deposited into Hasbrouck Insect Collection at Arizona State University. All observations, records, and images are publicly available in the Madrean Discovery Expeditions database (madreandiscovery.org). The database only includes records identified to species or as aff., cf., or nr. species.

RESULTS

A total of 406 species in 313 genera, 70 families, and 11 orders were documented in the Rancho Las Playitas insect fauna (Appendix 1). The orders with the most species were Lepidoptera (200 total, 154 moths, 46 butterflies), Coleoptera (117), Orthoptera (22), Odonata (20), and Hemiptera (16) and Hymenoptera (17). The families with the most species were Noctuidae (53, Lepidoptera), Erebidae (31, Lepidoptea), Carabidae (27, Coleoptera), Geometridae (26, Lepidoptera; Fig. 5B), Chrysomelidae (19, Coleoptera), Acrididae (16, Orthoptera; Figs. 10 A, B), Crambidae and Hesperiidae (14 each, Lepidoptera; Fig. 6B), Coenagrionidae (11, Odonata; Fig. 9B), and Buprestidae (Coleoptera), Formicidae (Hymenoptera), Nymphalidae (Lepidoptera; Fig. 6A), and Scarabaeidae (Coleoptera; Fig. 3B) (10 each). The genera with the most species were *Ponometia* Herrich-Schäffer, 1868 (Noctuidae, Lepidoptera) (8); *Argia* Rambur, 1844 (Coenagrionidae, Odonata) (Fig. 9B) and *Tarache* Hübner, 1823 (Noctuidae, Lepidoptera) (6 each); *Acmaeodera* Eschscholtz, 1829 (Buprestidae, Coleoptera); *Dasymutilla* Ashmead, 1899 (Mutillidae, Hymenoptera); *Lebia* Lastreille, 1802 (Carabidae, Coleoptera); *Leptinotarsa* Chevrolat in Djean, 1836 (Chrysomelidae, Coleoptera); *Melipotis* Hübner, 1818 (Erebidae, Lepidoptera)*,* and

Spragueia Grote, 1875 (Noctuidae, Lepidoptera) (4 each); and *Apodemia* Grote, 1875 (Riodinidae, Lepidoptera); *Brachinus* Weber, 1801 (Carabidae, Coleoptera); *Chauliognathus* Hentz, 1930 (Cantharidae, Coleoptera); *Chlaenius* Bonelli, 1810 (Carabidae, Coleoptera); *Cotinis* Burmeister, 1842 (Scarabaeidae, Coleoptera) (Fig. 3B); *Euchaetes* Harris, 1841 (Erebidae, Lepidoptera); *Lacinipolia* McDunnough, 1937 (Noctuidae, Lepidoptera); *Manduca* Hübner, 1807 (Sphingidae, Lepidoptera); *Pheidole* Westwood, 1839 (Formicidae, Hymenoptera); *Frederickia* Ferguson, 2008 (Geometridae, Lepidoptera), and *Pero* Herrich-Schäffer, 1855 (Geometridae, Lepidoptera) (3 each).

DISCUSSION

The Madrean Discovery Expeditions database currently has 26,082 insect records in 4,022 taxa from Sonora based on specimens, photographs, observations, and literature. There are 14,308 records (1,910 taxa) of Lepidoptera, including 9,885 records (1,518 taxa) of moths, of which 5,584 records (1,411 taxa) are from Palting. Sonoran records in the database include 5,252 records (1,131 taxa) of Coleoptera; 2,267 records (103 taxa) of Odonata, including those observations from Bailowitz and Danforth, and records in González-Soriano (2009); 1,027 records (83 taxa) of Orthoptera; and 1,701 records (138 taxa) of Formicidae. These numbers are minimal because numerous species are undescribed, and the names of many described insects are not in the Taxonomic Thesaurus created from the Catalog of Life, and it was therefore not possible to search for such species. Many records in the database are from biotic expeditions to Sky Island mountain ranges in northeastern Sonora in the Madrean Archipelago Biodiversity Assessment (MABA) program of Sky Island Alliance (2009-2014) and the Madrean Discovery Expeditions program of Greater Good Charities (2015-2023). Additional Sonoran records are from the Symbiota Collections of Arthropods Network (SCAN, scan.bugs.org). The records from Rancho Las Playitas provide insect coverage for a new area in Sonora.

NOTEWORTHY SPECIES

The distribution, biogeography, and ecology of many species of insects in Sonora are poorly known. A few Rancho Las Playitas records are noteworthy.

Some species found at Rancho Las Playitas are widespread in tropical Mexico as far north as Sonora. These include the butterflies *Apodemia hepburni* Godman & Salvin, 1886 (Riodinidae) and *Microtia elva* H. Bates, 1864 (Nymphalidae) (Glassberg 2017, de la Maza 1987); the leaf-cutter ant *Atta mexicana* (Formicidae, Alatorre-Bracamontes and Vásquez-Bolaños, 2010, Vásquez-Bolaños, 2011); the odonates *Argia anceps* Garrison, 1996 (Coenagrionidae, Fig. 9B) and *Dythemis maya* Calvert, 1906 (Libellulidae) (Bailowitz *et al.* 2015); the chafer beetle *Hologymnetis cinerea* Mannerheim, 1843 (Scarabaeidae, Ratcliffe 1992); and the shield-back bug *Pachycoris klugii* (Burmeister, 1835) (Scutelleridae, Maes, 1998, Fig. 4B). Many of these species have casual records in Arizona and some have established breeding populations. With global warming, the northern range limits of more tropical species will expand northward.

The large black and white moth *Morpheis clenchi* Donahue, 1980 (Cossidae, Fig. 5A) is the northernmost representative of a genus that occurs throughout the Neotropics. In the United States, it is still known only from the vicinity of the type locality, Sycamore Canyon, Santa Cruz County, Arizona (Powell and Opler, 2009).

Cotinis sinitoc Deloya, Ibanez-Bernal & Nogueira, 2000 (Scarabaeidae) is a Sonoran endemic species (Fig. 3B) that was described based on specimens from Cócorit and Rosario de Tesopaco in tropical southern Sonora (Deloya *et al*. 2000). Rancho Las Playitas is a range extension of 312 km north-northeasst of Rosario de Tesopaco.

Scaptolenus paltingi P.J. Johnson, 2013 (Elateridae) is a Sonoran endemic clickless rain click beetle that was described in honor of John D. Palting (Johnson, 2013). Rancho Las Playitas is the third locality for the species and 90 km north-northeast of the type locality in the Sierra Aconchi and 34 km west of the paratype locality in the Sierra La Púrica.

Aztecacris gloriosus (Acrididae) is a colorful grasshopper (Fig. 10A) in a monotypic genus that is endemic to the Arizona-Sonora border area. It was described from the Atascosa Mountains, Santa Cruz County, Arizona, and later reported in Mexico from the Sierra Las Avispas near Nogales, Sonora (Behrstock and Van Devender, 2015). Rancho Las Playitas is a range extension of 120 km to the southeast and the first record for the Municipality of Bacoachi.

Considering that the Arizona border is only 86 km to the north, some Rancho Las Playitas insects are temperate or southwestern United States species reaching their southern distributional limits. Several of them are new records for Sonora and Mexico, including *Cotinis impia* Deloya, Ibanez-Bernal & Nogueira, 2000 (Scarabaeidae, Deloya *et al.* 2000), *Pseudovates arizonae* Hebard, 1935 (Mantidae, Döring, 2022, Fig. 7A), *Oecanthus* cf. *rileyi* Baker, 1905 (Gryllidae; Walker, 1967, Fig. 10C), *Myrmecophilus manni* Schimmer, 1911 (Myrmecophilidae, Hebard, 1920), and *Diapheromera arizonensis* Caudell, 1903 (Diapheromeridae, Evans 2007). *Phrynotettix tshivavensis* (Haldeman, 1852) (Romaleidae, Capinera *et al.* 2004) is new for Chihuahua, Sonora, and Mexico. *Chrysobothris lixa* Horn, 1886 (Buprestidae) is new for Sonora (Westcott and Clark, 2015, Fig. 10D).

Cotinis impia was previously only known from southern Arizona and adjacent New Mexico. The Las Playitas specimen is a southeastern range extension of 108 kilometers.

The unicorn mantis *Pseudovates arizonae* was previously only known from Arizona. The Barranco Basaitequi observation (Fig. 7A) represents a 100 km south-southeast range extension.

The tree cricket *Oecanthus* cf. *rileyi* (Fig. 10C) was previously known from the western United States. In Sonora, it has been found in foothills thornscrub from Rancho Las Playitas south to the Moctezuma area and the Sierra Murrieta near Bacanora.

Myrmecophilus manni is a tiny ant cricket that lives in

nests of numerous species of ants (Hebard, 1920). It was previously known from southern Washington south through the western United States to Arizona. In Sonora, it is known from the Sierra Elenita near Cananea in pine-oak forest south to Rancho Las Playitas, the Sierras Buenos Aires and Juriquipa in oak woodland, and to Álamos in tropical deciduous forest in southern Sonora. A second species *M. americanus* Saussure, 1877 was found in the same area as *M. manni* at Álamos. *Myrmecophilus americanus* appears to be mostly host specific to *Paratrechina longicornis* (Latreille, 1802), which is pretty much distributed worldwide except in cold temperate and colder areas (Wetterer and Hugel, 2008).

Diapheromera arizonensis was previously known from Arizona and adjacent New Mexico. In Sonora, it is known from near Naco in desert grassland and Cabullona in Chihuahuan desertscrub south to Rancho las Playitas and Sahuaripa in foothills thornscrub.

Chrysobothris lixa was previously known from Arizona, New Mexico, and Texas in the United States, and Baja California and Chihuahua in Mexico (Westcott and Clark, 2015). Rancho Las Playitas is 205 km south-southeast of the Catalina Spring type locality near Tucson, Arizona.

Phrynotettix tshivavensis is a large lubber grasshopper that is common in Arizona and New Mexico but is also known from near Casas Grandes in northwestern Chihuahua (Fig. 10D). In Sonora, it is found in the northeastern Sky Island mountain ranges.

The moths *Olceclostera seraphica* (Dyar, 1906) (Apatelodidae) and *Philtraea elegantaria* (Edwards, 1881) (Geometridae) are interesting Mexican species in mostly northern genera that reach their northern distributional limits in the Arizona-Sonora borderlands. *Olceclostera seraphica* is best known from western Texas with a few records in New Mexico and southern Arizona (Powell and Opler 2009). Only a few records are known from Sonora. Although the type locality of *P. elegantaria* is Tucson, Arizona, this elegant species (Fig. 5B) is uncommon in the United States. It is widespread in the borderlands of northeastern Sonora.

Even when insect groups like the Carabidae are relatively well-known in Sonora, collections in different areas augment the knowledge of their distributions. *Brachinus fumans* (Fabricius, 1781)*, B. mexicanus* Dejean, 1831*, Calleida cordicollis* Putzeys, 1845*, Calosoma angulatum* Chevrolat, 1834*, Chlaenius chaudoiri* G. Horn, 1876*, C. leucoscelis* Chevrolat, 1834*, Cymindis punctigera punctigera* (LeConte, 1851)*, Galerita mexicana* Chaudoir, 1872*, Lebia tuckeri* (Case, 1920*, Notiobia brevicollis* (Chaudoir, 1837)*, N. mexicana* Dejean, 1829*, Pasimachus californicus* Chaudoir, 1850*, Selenophorus concinnus* Schaeffer, 1910*, Stenomorphus convexior* Notman, 1922*,* and *Tetracha carolina* Linnaeus, 1767 are new carabid records for the Municipality of Arizpe (Shpeley and Van Devender, 2022).

LOCALITY RECORDS

Locality records for the Sonoran noteworthy insects are from the Madrean Discovery Expeditions and SCAN databases. For rare species, all records are included. For more common species, selected records from northern Sonora are presented.

COLEOPTERA: Buprestidae: *Chrysobothris lixa*. Municipality of Arizpe. Barranco del Basaitequi, Rancho las Playitas, 14.8 km WSW of Bacoachi, 30.568°N 110.104°W, 1261 m elev, 21-Apr-2022, A. C. Thomson-M. Scarabaeidae: ***Cotinis impia***. Municipality of Bacoachi. Rancho Viejo, 10.3 km E of Bacanuchi, 30.606°N 110.129°W, 1180 m elev., 26-Sep-2019, T. R. Van Devender; Municipality of Cananea. 1.2 km NE of Cananea, 31.000°N 110.253°W, 1531 m elev., 23-Sep-2019. T. R. Van Devender. ***Cotinis sinitoc***. Municipality of Arizpe. Arroyo Padercitas, Rancho las Playitas, 15.6 km WSW of Bacoachi, 30.576°N 110.129°W, 1140 m elev., 6-Jul-2019, D. S. Turner (Fig. 3B). ***Hologymnetis cinerea***: Municipality of Arizpe, Barranco del Basaitequi, Rancho las Playitas, 14.8 km WSW of Bacoachi, 30.568°N 110.104°W, 1261 m elev., 29-Sep-2021, R. W. Van Devender; 12.0 km WNW of Sinoquipe, 30.193°N 110.361°W, 1091 m elev., 7-Aug-2018, E. Makings; Municipality of Bacoachi. Rancho Viejo, 10.3 km E of Bacanuchi, 30.606°N 110.129°W, 1180 m elev., 26-Sep-2019, T. R. Van Devender; Municipality of Cananea. 1.2 km NE of Cananea, 30.997°N 110.253°W, 1531 m elev., 23-Sep-2019, T. R. Van Devender; Municipality of Mazatán. W side of Mazatán, 29.005°N 110.148°W, 550 m elev., 26-Jun-2012, T. R. Van Devender; Municipality of Villa Pesqueira, 1.8 km SSE of Nácori Grande, 29.045°N 110.046°W, 673 m elev., 11-Jul-2019, A. L. Reina-Guerrero; 0.9 km NNE of Nácori Grande, 29.066°N 110.048°W, 644 m elev., 8-Aug-2012, T. R. Van Devender. ***Scaptolenus paltingi:*** Municipality of Aconchi. Rancho los Alisos, 9.4 km WSW of Aconchi, Sierra Aconchi, 29.798°N 110.320°W, 1301 m elev., 2-Jul-2013, T. R. Van Devender, J. D. Palting; Municipality of Bacoachi. Rancho las Playitas, 12.5 km WSW of Bacoachi, 30.595°N 110.092°W, 1438 m elev., 6-Jul-2019, J. D. Palting, T. R. Van Devender; Municipality of Nacozari de García. Rancho El Jarazo, 22.4 km N of Nacozari de García, Sierra la Púrica, 30.576°N 109.733°W, 1595 m elev., 16-Jul-2013, T. R. Van Devender, J. D. Palting.

HEMIPTERA: Scutelleridae: *Pachycoris klugii*: Municipality of Aconchi. Rancho los Alisos, 9.4 km WSW of Aconchi, Sierra Aconchi, 29.798°N 110.320°W, 1301 m elev., 2-Sep-2012, T. R. Van Devender; Municipality of Bacoachi. W side of Picacho de Bacoachi, Rancho las Playitas, 12.2 km WSW of Bacoachi, 30.600°N 110.089°W, 1510 m elev., 7-Jul-2019, S. D. Carnahan (Fig. 4B).

HYMENOPTERA: Formicidae: *Atta mexicana*: Municipality of Arizpe. Barranco del Basaitequi, Rancho las Playitas, 14.8 km WSW of Bacoachi, 30.568°N 110.104°W, 1261 m elev., 30-Sep-2021; T. R. Van Devender; Municipality of Bacoachi. Rancho las Playitas, 12.5 km WSW of Bacoachi, 30.595°N 110.092°W, 1438 m elev., 6-Jul-2019, T. R. Van Devender; Municipality of Cananea. Rancho El Chiltepín, 23.3 km S of Cananea, foothills of the Sierra Manzanal, 30.772°N 110.289°W, 1299 m elev., 13-Sep-2014, T. R. Van Devender; Municipality of General Plutarco Elías Calles. 2.1 km SSE of Sonoyta, northern foothills of the Sierra Cubabi, 31.846°N 112.856°W, 423 m elev., 17-Mar-2013, T. R. Van Devender; Municipality of Ímuris. Rancho Agua Caliente, 17.2 km N of Ímuris, 30.954°N 110.853°W, 975 m elev., 28-Mar-2010, T.R. Van Devender.

LEPIDOPTERA: Apatelodidae: ***Olceclostera seraphica***. Municipality of Bacoachi. Rancho las Playitas, 12.5 km WSW of Bacoachi, 30.595°N 110.092°W, 1438 m elev., 6-Jul-2019, J. D. Palting; Municipality of Ímuris. Rancho El Aribabi, Río Cocóspera, 20.3 km ENE of Ímuris, Sierra Azul, 30.856°N 110.666°W, 990 m elev., 20-Aug-2009, J. D. Palting. Cossidae: ***Morpheis clenchi***. Municipality of Bacoachi. Rancho las Playitas, 12.5 km WSW of Bacoachi, 30.595°N 110.092°W, 1438 m elev., 6-Jul-2019, J. D. Palting; Municipality of Moctezuma. Rancho San Fernando, E side of Sierra de la Madera, 17.4 km W of Huásabas, 20.5 km ENE of Moctezuma, 29.929°N 109.482°W, 1490 m elev., 5-Aug-2010, J. D. Palting; Municipality of Nogales. Rancho Las Avispas, 15.5 km SW of Nogales, Sierra Las Avispas, 31.193°N 111.101°W, 1200 m elev., 21-Jul-2012, J. D. Palting; Municipality of Sahuaripa. Rancho La Tigre, 8.7 km ESE of Güisamopa, 28.622°N 109.020°W, 1364 m elev., 24-Aug-2021, J.D. Palting; Municipality of San Felipe de Jesús. Rancho El Llano, 14.5 km WNW of San Felipe de Jesús, Sierra Los Locos, 29.878°N 110.387°W, 1304 m elev., 5-Aug-2019, J. D. Palting. Geometridae: ***Philtraea elegantaria***. Municipality of Agua Prieta. Rancho El Pinito, 56.5 km ESE Agua Prieta, Sierra San Luis, 31.191°N 108.941°W, 1432 m elev., 7-Sep-2009, J. D. Palting; Rancho Los Ojos Calientes, El Cajón Bonito, 48.6 km ESE of Agua Prieta, Sierra San Luis, 31.278°N 109.001°W, 1298 m elev., 23-Apr-2017, J. D. Palting; Municipality of Arizpe. Arroyo Padercitas, Rancho las Playitas, 15.6 km WSW of Bacoachi, 30.576°N 110.129°W, 1149 m elev., 3-Oct-2021, R. W. Van Devender (Fig. 5B); Rancho La Cieneguita, 14.9 km WNW of Arizpe, Sierra San Antonio, 30.353°N 110.325°W, 1148 m elev., 1-May-2011, J. D. Palting; Barranco del Basaitequi, Rancho las Playitas, 14.8 km WSW of Bacoachi, 30.568°N 110.104°W, 1261 m elev., 28-Sep-2021, T. R. Van Devender; Municipality of Bacoachi. Rancho las Playitas, 12.5 km WSW of Bacoachi, 30.595°N 110.092°W, 1438 m elev., 6-Jul-2019, J. D. Palting; Rancho las Playitas, 17.1 km WSW of Bacoachi, 30.576°N 110.134°W, 1139 m elev., 14-Apr-2019, G. Molina-Padilla; Municipality of Cananea. El Pinal Canyon, 17.9 km SSE of Cananea, Sierra el Alacrán, 30.835°N 110.229°W, 1577 m elev., 15-Sep-2018, J. D. Palting; Municipality of Ímuris. Rancho El Aribabi, Río Cocóspera, 20.3 km ENE of Ímuris, Sierra Azul, 30.856°N 110.666°W, 990 m elev., 20-Aug-2009, J. D. Palting; Municipality of Nacozari de García. Campo Bonito, Arroyo Chinoso, 1.6 km below Mina El Tigre tailings, 39.9 km WNW Bavispe, Sierra El Tigre, 30.580°N 109.269°W, 1246 m elev., 18-Mar-2010; Municipality of Nogales. Rancho Las Avispas, 15.5 km SW of Nogales, Sierra Las Avispas, 31.193°N 111.101°W, 1200 m elev., 21-Jul-2012. Riodinidae: ***Apodemia hepburni***: Municipality of Arizpe. Arroyo Toro Muerto, 2.6 km SW of Arizpe, E side of Sierra San Antonio, 30.321°N 110.191°W, 841 m elev., 15-Mar-1995, D. Danforth; Municipality of Bacoachi, 7.4 km SW of Bacoachi, 30.573°N 110.007°W, 1104 m elev., 20-May-2022, T. R. Van Devender; Municipality of Ímuris. 8 mi S of Cíbuta, 30.958°N 110.863°W, 988 m elev., 9-Aug-1991, J. P. Brock; Municipality of Nogales. Cañón Plancha de Platas, Rancho Esmeralda, 16 km WSW of Nogales, Sierra las Avispas, 31.212°N 111.128W, 1090 m. elev., 27-Oct-2010, J. P. Brock; Municipality of Santa Ana. Arroyo Cajón del Agua, 19.6 km NW of Cucurpe, Sierra Cucurpe, 30.411°N 110.888°W, 939 m elev., 20-Mar-2018, R. A. Bailowitz, D. Danforth; ***Microtia elva*****:** Municipality of Arizpe. Arroyo Las Padercitas, Rancho las Playitas, 16.8 km WSW of Bacoachi, 30.576°N 110.129°W, 1140 m elev., 30-Sep-2021, T. R. Van Devender; Municipality of Cananea. La Cieneguita de Santa Águeda, 15.2 km SE of Cananea, northern Sierra El Alacrán, 30.880°N 110.178°W, 1408 m elev., 27-Oc-2018, G. Molina-Padilla; W edge of Cuitaca, 31.007°N 110.498°S, 1267 m elev., 23-Sep-2006, H. Brodkin, T. Wood, S. Williamson; Municipality of Nogales. Cañada Adrián, 16.5 km WSW of Nogales, Sierra Las Avispas, 31.220°N 111.137°W, 1109 m elev., 29-Sep-2013, R. A. Bailowitz.

MANTODEA: Mantidae: ***Pseudovates arizonae***. Municipality of Arizpe. Barranco Basaitequi, 15.2 km WSW of Bacoachi, Rancho Las Playitas, 30.569°N 110.109°W, 1231 m elev., 21-Apr-2022, J. G. Martínez-Valenzuela (Fig, 7B); Municipality of Fronteras. Rancho Capulín, 23.5 km WSW of Fronteras, Sierra Buenos Aires., 30.762°N 109.824°W, 1429 m elev., 2-Jul-2016, J. D. Palting.

ODONATA: Coenagrionidae: ***Argia anceps***: Municipality of Agua Prieta. Río San Bernardino, Rancho San Bernardino, 25.4 km E of Agua Prieta, 31.295°N 109.258°W, 1104 m elev., 19-Sep-2017, R. A. Bailowitz, D. Danforth; Punta del Agua, Cajón Bonito, Rancho la Victoria, 56.5 km ESE of Agua Prieta, Sierra San Luis, 31.223°N 108.943°W, 1406 m elev., 23-Apr-2017, D. Danforth, F. Heath; Municipality of Bacoachi. Rancho las Playitas, 16.3 km WSW of Bacoachi, 30.582°N 110.129°W, 1140 m elev., 14-Apr-2019, G. Molina-Padilla; Municipality of Ímuris. Río Cocóspera, Rancho Aribabi, 18.8 km ENE of Ímuris, Sierra Azul, 30.854°N 110.665°W, 990 m elev., 11-Apr-2019, R. A. Bailowitz, D. Danforth; Municipality of Nogales. Cañada Adrián, 16.5 km WSW of Nogales, Sierra Las Avispas, 31.220°N 111.137°W, 1109 m elev., 29-Sep2013, R. A, Bailowitz; Municipality of Santa Ana. Arroyo Cajón del Agua, 19.6 km NW of Cucurpe, Sierra Cucurpe, 30.412°N 110.888°W, 939 m elev., 20-Mar-2018, R.A. Bailowitz, D. Danforth (Fig. 9B). Libellulidae: ***Dythemis maya***: Municipality of Bacadéhuachi. 10.5 km E of Bacadéhuachi, Sierra de Bacadéhuachi, 29.810°N 109.027°W, 1228 m elev., 3-Sep-2011, J. D. Palting; Municipality of Bacoachi. Rancho las Playitas, 15.6 km WSW of Bacoachi, 30.582°N 110.129°W, 1140 m elev., 4-Nov-2019, G. Molina-Padilla, J. A. Salazar-Martínez; Municipality of Cumpas. Rancho Carrizal, 15.5 km E of Cumpas, 29.995°N 109.618°W, 934 m elev., 28-Sep-2018, D. E. Moreno-Urías; Municipality of Ímuris. Río Cocóspera, Rancho Aribabi, 18.8 km ENE of Ímuris, Sierra Azul, 30.854°N 110.665°W, 990 m elev., 11-Apr-2019, R. A. Bailowitz, D. Danforth; Municipality of Santa Ana. Arroyo Cajón del Agua, 19.6 km NW of Cucurpe, Sierra Cucurpe, 30.412°N 110.888°W, 939 m elev., 20-Sep-2019, R. A. Bailowitz, D. Danforth.

ORTHOPTERA: Acrididae: ***Aztecacris gloriosus***. Municipality of Bacoachi. Rancho las Playitas, 13.8 km WSW of Bacoachi, 30.596°N 110.105°W, 1347 m elev., J. A. Salazar-Martínez (Fig. 10A). Gryllidae: ***Oecanthus*** **cf.** ***rileyi***. Municipality of Arizpe. Barranco Basaitequi, 14.9 km WSW of Bacoachi, Rancho Las Playitas, 30.598°N 110.104°W, 1261 m elev., 29-Sep-2021, T.R. Van Devender; Municipality of Bacanora. Rancho las Tierras de Jiménez, 14.2 km SW of Bacanora, Sierra de Murrieta, 28.901°N 109.514°W, 1387 m elev., 14-Sep-2022, H. Sil-

va-Kurumiya; Municipality of Moctezuma. Nícora, 2.0 km SSW of Moctezuma, 29.780°N 109.680°W,616 m elev., 17-Nov-2021, H. Silva-Kurumiya; Rancho La Gotera, 29.8 km SSW of Moctezuma, 29.557°N 109.797°W, 745 m elev., 21-Sep-2021, H. Silva-Kurumiya (Fig. 10C). Myrmecophilidae: ***Myrmecophilus americanus***. Municipality of Álamos. Rancho Acosta, Álamos, 27.023 109.925, 372 m elev., 10-Mar-2022, R. A. Johnson; ***Myrmecophilus manni***. Municipality of Álamos. Rancho Acosta, Álamos, 27.023 109.925, 372 m elev., 6-Mar-2022, R. A. Johnson; Municipality of Arizpe. Barranco Basaitequi, 14.8 km WSW of Bacoachi, Rancho Las Playitas, 30.568°N 110.104°W, 1261 m elev., 22-Jan-2022, R. A. Johnson; Municipality of Fronteras. El Aserradero, 24.0 km WSW of Fronteras, Sierra Buenos Aires, 30.727°N 109.820°W, 1703 m elev., 16-Aug-2016, R. A. Johnson; Municipality of Nacozari de García. 2.0 km S of Santo Domingo, 15.9 km SE of Nacozari de García, Sierra Juriquipa, 30.268°N 109.580°W, 1470 m elev., 14-Aug-2017, R. A. Johnson; Rancho San Felipe, 1.3 km S of Santo Domingo, 15.4 km SE of Nacozari de García, Sierra Juriquipa, 30.271°N 109.583°W, 1488 m elev., 15-Aug-2017, R. A. Johnson; Rancho la Zulema, 15.9 km SE of Nacozari de García, Sierra Juriquipa, 30.284°N 109.560°W, 1687 m elev., 1-Aug-2017, R. A. Johnson. Romaleidae**:** ***Phrynotettix tshivavensis***. Municipality of Agua Prieta. Rancho El Pinito, 56.5 km ESE Agua Prieta, Sierra San Luis, 31.191° N108.941°W, 1432 elev., 7-Sep-2009, J. D. Palting; Municipality of Arizpe. Barranco del Basaitequi, Rancho las Playitas, 14.8 km WSW of Bacoachi, 30.568°N 110.104°W, 1261 m elev., 28-Sep-2021, T. R. Van Devender; Represo María Luisa, Rancho las Playitas, 14.7 km WSW of Bacoachi, 30.582°N 110.110°W, 1317 m elev., R. W. Van Devender; Municipality of Bacadéhuachi. Aserradero La Matancita, 14.0 km ENE of Bacadéhuachi, Sierra de Bacadéhuachi, 29.837°N 109.000°W, 1674 m elev., 31-Jul-2011, T.R. Van Devender; Municipality of Bacoachi. W side of Picacho de Bacoachi, Rancho las Playitas, 12.2 km WSW of Bacoachi, 30.597°N 110.089°W, 1510 m elev., 7-Jul-2019, S. D. Carnahan (Fig. 10B); El Álamo, Rancho Las Playitas, 14.3 km WSW of Bacoachi, 30.595°N 110.111°W, 1337 m elev., G. Molina-Padilla; Municipality of Bavispe. N of Mina el Tigre, 30.1 km WNW of Bavispe, Sierra el Tigre, 30.602°N 109.221°W, 1936 m elev., 12-Aug-2015, T. R. Van Devender; Municipality of Cananea. Observatorio Astrofisico 'Guillermo Haro', Sierra Mariquita, 9.4 km of NNW Cananea, 31.054°N 110.383°W, 2422 m elev., 19-Sep-2010, T. R. Van Devender; Arroyo el Quince, Sierra Elenita, ca. 10.1 km WNW of Cananea, 31.002°N 110.388°W, 2001 m elev., 1-May-2016, M. Brummermann; Municipality of Fronteras. El Aserradero, 24.0 km WSW of Fronteras, Sierra Buenos Aires, 30.727°N 109.814°W, 1707 m elev., C. Hedgcock; 7.9 km ESE of Esqueda, 30.698°N 109.508°W, 1275 m elev., 16-Aug-2017, T. R. Van Devender; Municipality of Ímuris. Rancho El Salto, 26.7 km ESE Ímuris, Sierra Azul, 30.729°N 110.579°W, 2047 m elev., 31-Jul-2011, T. R. Van Devender; Municipality of Nacozari de García. Rancho el Tigre, 27.2 km WNW of Bavispe, Sierra el Tigre, 30.583°N 109.198°W, 2300 m elev., 11-Aug-2015, J. D. Palting; Pilares de Nacozari, 6.5 km SE of Nacozari de García, Sierra Nacozari, 30.328°N 109.630°W, 1413 m elev., J. D. Palting; Rancho la Zulema, 15.9 km SE of Nacozari de García, Sierra Juriquipa, 30.284°N 109.560°W, 1687 m elev., 13-Jul-2017, T. R. Van Devender; Municipality of San Felipe de Jesús. Rancho El Llano, 14.5 km WNW of San Felipe de Jesús, Sierra Los Locos, 29.878°N 110.387°W, 1304 m elev., R. W. Van Devender.

PHASMATODEA: Diapheromeridae: *Diapheromera arizonensis*. Municipality of Agua Prieta. Arroyo Guadalupe, Rancho Puerta Blanca, 40.3 km E of Agua Prieta, 31.332°N 109.089°W, 1285 m elev., 29-Sep-2009, J. O. Schmidt; Municipality of Arizpe. Arroyo Las Padercitas, Rancho las Playitas, 16.8 km WSW of Bacoachi, 30.576°N 110.129°W, 1140 m elev., 30-Sep-2021, A. L. Reina-Guerrero; Barranco del Basaitequi, Rancho las Playitas, 14.8 km WSW of Bacoachi, 30.568°N 110.104°W, 1261 m elev., 16-Oct21, T. R. Van Devender; Municipality of Bacoachi, Arroyo Agua Verde, Rancho las Playitas, 14.4 km WSW of Bacoachi, 30.678°N 110.116°W, 1284 m elev., 26-Sep-2019, T. R. Van Devender; Municipality of Nacozari de García. Rancho Viejo, 17.2 km N of Nacozari de García, Sierra la Púrica, 30.531°N 109.756°W, 1644 m elev., 8-Aug-2013, L. E, Stevens; Municipality of Sahuaripa. Sahuaripa, 29.062°N 109.242°W, 441 m elev., 13-Sep-2022, G. Molina-Padilla.

ACKNOWLEDGMENTS

We thank the many biologists who participated in the various Madrean Discovery Expeditions activities on Rancho Las Playitas. Images in the figures were provided by Susan D. Carnahan, Doug Danforth, J. Gerardo Martínez-Valenzuela, Guillermo Molina-Padilla, Ana Lilia Reina-Guerrero, José Abel Salazar-Martínez, Hugo Silva-Kurumiya, R. Wayne Van Devender, Thomas R. Van Devender, and Gertrudis Yanes-Arvayo. Greater Good Charities has supported the documentation of biodiversity in Sonora through the Madrean Discovery Expeditions program. The hospitality, encouragement, and friendship of José Adolfo Salazar-Espinoza were essential to explore his Rancho Las Playitas and are greatly appreciated. Ryan Zach facilitated support from Zoo Miami for Madrean Discovery Expeditions Rancho Las Playitas I and II. Images. Dennis Caldwell drafted the map in Fig. 1.

LITERATURE CITED

Alatorre-Bracamontes, C. E., y M. Vásquez-Bolaños. 2010. Lista comentada de las hormigas (Hymenoptera: Formicidae) del norte de México. *Dugesiana* 17(1): 9-36.

Atkinson, T. H. 2019. Escarabajos descortezadores y ambrosiales (Coleoptera: Curculionidae: Scolytinae, Platypodinae) de Sonora, México. *Dugesiana* 26(1): 41-49.

Bailowitz, R., J. Brock, and D. Danforth. 2017. Annotated checklist of the butterflies (Lepidoptera) of Sonora, Mexico. Lista comentada de las mariposas (Lepidoptera) de Sonora, México. *Dugesiana* 24(2): 125-147.

Bailowitz, R., D. Danforth, and S. Upson. 2015. *A Field Guide to the Damselflies & Dragonflies of Arizona and Sonora.* Nova Granada Publications, Tucson, Arizona.

Behrstock, R. A., and T. R. Van Devender. 2015. First records of *Aztecacris gloriosus* (Hebard) (Orthoptera: Acrididae) for México. Primeros registros de *Aztecacris gloriosus* (Hebard) (Orthoptera: Acrididae) para Méxi-

co. *Dugesiana* 22(2): 97-99.

Brown, D. E., and C. H. Lowe. 1978. Biotic Communities of the Southwest. USDA Forest Service General Technical Report RM-41. map. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Capinera, J. L., R. D. Scott, and T. J. Walker. 2004. *Field Guide to the Grasshoppers, Katydids, and Crickets of the Unted States.* Cornell University Press, Ithaca, New York.

Castillo-Gámez, R. A., J. P. Gallo-Reynoso, J. Egido-Villareal y W. Caire. 2010. Mamíferos (pp. 421-436) In: F. Molina-Freaner. and T. R. Van Devender (eds.), *Diversidad Biológica de Sonora,* Universidad Nacional Autónoma de México, Hermosillo, Sonora.

de la Maza, R. 1987. *Mariposas Mexicanas.* Fondo de Cultura Económica, Mexico, D.F.

Deloya, C., S. Ibáñez-Bernal, and G. Noguera. 2000. A new species of *Cotinis* (*Cotinis*) (Coleoptera: Melolonthidae) and a key for the identification of Mexican species. *Entomological News* 111(3): 171-176.

Döring. M. 2022. *Pseudovates arizonae* Hebard, 1935 in English Wikipedia - Species Pages. Wikimedia Foundation. Checklist dataset https://doi.org/10.15468/c3kkgh accessed via GBIF.org on 2024-01-09.

Evans, A. V. 2007. *National Wildlife Federation Field Guide to Insects and Spiders & Related Species of North America.* Union Square & Co.

Glassberg, J. 2017. *A Swift Guide to Butterflies of Mexico and Central America.* Princeton University Press, Princeton, New Jersey.

González-Soriano, E., F. A. Noguera, S. Zaragoza-Caballero y E. Ramírez-García. 2009. Odonata de un bosque caducifolia: sierra de San Javier, Sonora, Mexico. Odonata from a tropical deciduous forest: sierra San Javier, Sonora, Mexico. *Revista Mexicana de Biodiversidad* 80(1): 341-348.

Hebard, M. 1920. A revision of the North American species of the genus *Myrmecophila* (Orthoptera: Gryllidae: Myrmecophilinae). *Transactions of the American Entomological Society* 46: 91-111.

Johnson, P. J. 2013. A new species of *Scaptolenus* LeConte (Coleoptera: Elateridae: Cebrioninae) from Sonora, México, with a checklist of species of northern México and the United States. Nueva especie de *Scaptolenus* (Coleoptera: Elateridae: Cebrioninae) para Sonora, México, con una lista de las especies del norte de México y los Estados Unidos. *Dugesiana* 20(2): 105-110.

Johnson, P. J. 2018. New species of Elateridae (Coleoptera) from Sonora, Mexico, with new country and site records, new taxonomic changes, and a classificatory checklist. Nuevas especies de Elateridae (Coleoptera) de Sonora, México, con nuevos registros para el estado y el país, nuevos cambios taxonómicos y una lista clasificada. *Dugesiana* 25(1): 11-31.

Lemos-Espinal, J. A., G. R. Smith, and J. C. Rorabaugh. 2019. A conservation checklist of the amphibians and reptiles of Sonora, Mexico, with updated species lists. *ZooKeys* 829: 131-160.

Maes, J. M. 1998. *Insectos de Nicaragua.* Setab BOSAWAS, MARENA, Nicaragua. Vol. I:1-485.

Noguera, F. A., M. A. Ortega-Huerta, S. Zaragoza-Caballero, E. González-Soriano, and E. Ramírez-García. 2009. A faunal study of Cerambycidae (Coleoptera) from one region with tropical dry forest in Mexico: Sierra de San Javier, Sonora. *The Pan-pacific Entomologist* 85(2): 70-90.

Powell, J. A., and P. A. Opler. 2009. *Moths of Western North America.* University of California Press, Berkeley, Los Angeles, London.

Ratcliffe, B. C. 1992. The biogeograhy and phylogeny of *Hologymnetis* (Coleoptera: Scarabaeidae: Cetoniinae) with a revision of the genus. *The Coleopterists Bulletin* 46(2): 161-202.

Rodríguez-Mirón, G. M., S. Zaragoza-Caballero, S. López-Pérez, and M. Ordóñéz-Reséndiz. 2021. Leaf beetles attracted to light in a tropical dry forest of northern Mexico (Coleoptera: Chrysomelidae). *Dugesiana* 28(2): 279-29.

Sánchez-Piñero, F., and R. L. Aalbu. 2002. Tenebrionid beetles. (pp 129-153, 554-564) In: T.J. Case. M.L. Cody, and E. Ezcurra (eds.). *A New Island Biogeography of the Sea of Cortés.* Oxford University Press, Oxford, New York.

Shpeley, D., and T. R. Van Devender. 2022. An annotated checklist of ground beetles (Insecta: Coleoptera: Carabidae) occurring in the state of Sonora, Mexico with descriptions of new species and notes about some collection localities. Lista anotada de carábidos (Insecta: Coleoptera: Carabidae) que occurren en el estado de Sonora, México, con descripción de nuevas especies y notas sobre algunas localidades de colecta. *Dugesiana* 29(1): 41-137.

Turner, D. S., T. R. Van Devender, S. F. Hale, R. Zach, R. Martínez, R. W. Van Devender, J. S. Salazar-Martínez, G. Molina-Padilla, W. C. Sherbrooke, C. Aguilar-Morales, J. H. Valdez-Villavicencio, A. Peralta-García, S. L. Minter, H. Silva-Kurumiya, R. A. Villa, G. Yanes-Arvayo, M. Montañez-Armenta, and C. Paholski. 2022. Amphibians and reptiles of Rancho Las Playitas area, Sonora, Mexico. *Sonoran Herpetologist* 35(2): 62-71.

Van Devender, T. R., and W. E. Hall. 1994. Holocene arthropods from the Sierra Bacha, Sonora, Mexico, with emphasis on beetles (Coleoptera). *The Coleopterists Bulletin* 48(1): 30-50.

Van Devender, T. R., and A. L. Reina-Guerrero. 2016. The tropical Madrean flora of Yécora, Sonora, Mexico. *Phytoneuron* 7-1-23.

Van Devender, T. R., and A. L. Reina-Guerrero. 2021. The vegetation of Sonora, Mexico. *Phytoneuron* 2021: 67:1-22.

Van Devender, T. R., A. L. Reina-Guerrero., S. F. Hale, S. D. Carnahan, G. Molina-Padilla, and J. A. Sala-

zar-Martínez. 2023. Preliminary flora of El Picacho de Bacoachi-Rancho Las Playitas, Sonora, Mexico. *Plant Press Arizona* 46: 34-46.

Van Devender, T. R., A. L. Reina-Guerrero., S. F. Hale, and G. Molina-Padilla 2022. Flora and vegetation of Rock Horned Lizard (*Phrynosoma ditmarsi*) sites, Rancho Las Playitas, Sonora, Mexico. *Canotia* 18: 170-181.

Van Devender, T. R., A. C. Sanders, R. K. Wilson, and S. A. Meyer. 2000. Vegetation, flora, and seasons of the Río Cuchujaqui, a tropical deciduous forest near Alamos, Sonora, México. (pp. 36-101) In: R. H. Robichaux and D. A. Yetman (eds.), *The Tropical Deciduous Forest of Alamos: Biodiversity of a Threatened Ecosystem in Mexico.* University of Arizona Press, Tucson.

Vásquez-Bolaños, M. 2011. Lista de especies de hormigas (Hymenoptera: Formicidae) para México. *Dugesiana* 18(1): 95-133.

Villaseñor-Gómez, J. F., O. Hinojosa-Huerta, E. Gómez-Limón., D. Krueper y A. D. Flesch. 2010. Avifauna. (pp. 385-420) In: F. Molina-Freaner and T. R. Van Devender (eds.), *Diversidad Biológica de Sonora,* Universidad Nacional Autónoma de México, Hermosillo, Sonora.

Recibido: 5 de junio 2023
Aceptado: 6 noviembre 2023

Walker, T. J. 1967. Revision of the Oecanthinae (Grillidae: Orthoptera) of America south of the United States. *Annals of the Entomological Society of America* 60(4): 784-796.

Westcott, R. L., and W. H. Clark. 2015. *Chrysobothris lixa* Horn, 1886 (Coleoptera: Buprestidae) confirmed in Baja California, Mexico and newly recorded for New Mexico, U.S.A., with other notes on the species and the historical locality Catalina Springs, Arizona. *Pan-Pacific Entomologist* 91(4): 352-355.

Wetterer, J. K., and S. Hugel. 2008. Worldwide spread of the ant cricket *Myrmecophilus americanus*, a symbiont of the longhorn crazy ant, *Paratrechina longicornis*. *Sociobiology* 52(1): 157-165.

Zaragoza-Caballero, S., y E. Ramírez-García. 2009. Diversidad de Cantharidae, Lampyridae, Lycidae, Phengodidae y Telegeusidae (Coleoptera: Elateroidea) en un bosque tropical caducifolio de la sierra de San Javier, Sonora, México. *Revista Mexicana de Biodiversidad* 80(1): 675-686.

Appendix 1. Checklist of the insects of the Rancho Las Playitas area. Taxa arranged alphabetically by order, family, genus, and species.

BLATTOIDEA

Nyctiboridae

Nyctibora tetrasticta Hebard, 1922

COLEOPTERA

Anthicidae

Duboisius cf. *barri* (Abdullah, 1964)

Buprestidae

Acmaeodera decipiens LeConte, 1858
Acmaeodera flavomarginata Kerremans, 1897
Acmaeodera gibbula Hespenheide, 2007
Acmaeodera solitaria Van Dyke, 1942
Agrilus paraimpexus Casey, 1909
Chrysobothris lixa Horn, 1886
Chrysobothris rossi (LeConte, 1854)
Hippomelas planicauda (LeConte)
Hippomelas sphenicus (Crotch, 1874)
Lampetis webbii Horn, 1885

Cantharidae

Chauliognathus lewisi (LeConte, 1858)
Chauliognathus misellus Chaudoir
Chauliognathus profundus Chevrolat

Carabidae

Brachinus elongatulus Chaudoir, 1878
Brachinus fumans (Fabricius, 1781)
Brachinus mexicanus Dejean, 1831
Calleida cordicollis Putzeys, 1845
Calosoma angulatum Chevrolat, 1834
Chlaenius chaudoiri G. Horn, 1876
Chlaenius forreri Bates, 1884
Chlaenius leucoscelis Chevrolat, 1834
Colliuris lioptera (Bates, 1891)
Coptodera brunnea Shpeley & Ball, 1993
Cymindis punctigera punctigera (LeConte, 1851)
Discoderus robustus G. Horn, 1883
Dyscolus falli (Darlington, 1936)
Dyscolus megalops (Bates, 1882)
Galerita mexicana Chaudoir, 1872
Helluomorphoides latitarsis (Casey, 1931)
Lebia atriceps LeConte, 1863
Lebia cymindoides Bates, 1883
Lebia pimalis Chaudoir
Lebia tuckeri (Case, 1920)
Notiobia brevicollis (Chaudoir, 1837)
Notiobia mexicana Dejean, 1829
Pasimachus californicus Chaudoir, 1850
Selenophorus concinnus Schaeffer, 1910
Stenomorphus convexior Notman, 1922
Tetracha carolina Linnaeus, 1767

Cerambycidae

Aneflus protensus LeConte, 1853
Anelaphus piceus Santos-Silva, 2007
Derobrachus geminatus LeConte, 1873
Derobrachus hovorei Bates, 1885
Moneilema gigas Motschulsky, 1845
Oncideres rhodosticta Gory, 1831
Prionus californicus (Say, 1824)
Sphaenothecus bilineatus (Gory & Percheron, 1833)
Stenaspis solitaria (Rogers, 1856)

Chrysomelidae

Acalymma trivitatum (Mannerheim, 1843)
Calligrapha serpentina (Rogers, 1856)
Diabrotica undecimpunctata Mannerheim, 1843
Disonycha glabrata (Fabricius, 1775)
Disonycha politula Horn, 1889
Exema conspersa (Mannerheim, 1843)
Leptinotarsa decemlineata (Say, 1824)
Leptinotarsa haldemani (Rogers, 1856)
Leptinotarsa peninsularis (Horn, 1894)
Leptinotarsa cf. *tumamoca* Tower, 1918
Malacorhinus sp. nov.
Neobrotica pluristica Fall, 1910
Pachybrachis cf. *bullatus* Fall, 1915
Paranapiacaba tricincta (Say, 1824)
Saxinis cf. *hornii* Fall, 1909
Scelida nigricornis (Jacoby, 1888)
Syphrea flavicollis (Jacoby, 1884)
Zygogramma arizonica Schaeffer, 1906
Zygogramma tortuosa (Rogers, 1856)

Cleridae

Cymatodera fuscula LeConte, 1852
Enoclerus quadrisignatus (De Geer, 1775)

Coccinellidae

Coccinella septempunctata (Linnaeus, 1763)
Coleomegilla maculata Guérin-Méneville, 1842
Cycloneda sanguinea (Mulsant, 1866)
Hippodamia convergens (LeConte, 1856)
Olla v-nigrum (Linnaeus, 1758)

Curculionidae

Ericydeus lautus Aubé, 1838

Dynastidae

Strategus cf. *aloeus* Laporte, 1835

Dytiscidae

Laccophilus fasciatus (Say, 1830)
Laccophilus pictus (Gray, 1832)
Rhantus gutticollis LeConte, 1854
Thermonectus marmoratus (Olivier, 1791)

Elateridae

Chalcolepidius smaragdinus Motschulsky, 1859
Diplostethus arizonensis (Schaeffer, 1905)

Scaptolenus paltingi P.J. Johnson, 2013
Vesperelater arizonicus (Hyslop, 1918)

Erotylidae
Ischyrus cf. *quadripunctatus* Dugés, 1878

Gyrinidae
Dineutus sublineatus (Chevrolat, 1834)

Hydrophilidae
Hydrophilus insularis (Laporte de Castelnau, 1840)
Tropisternus cf. *affinis* Gorham, 1884

Lycidae
Lycus fernandezi (Say, 1824)
Lycus sanguineus Horn, 1891

Meloidae
Epicauta corvina (LeConte, 1858)
Epicauta segmenta Schaeffer
Nemognatha nigripennis LeConte, 1853
Pyrota akhurstiana (Horn, 1887)
Pyrota obliquefascia Horn, 1874

Melolonthidae
Phyllophaga cf. *lenis* (Casey, 1915)

Mycteridae
Mycterus quadricollis LeConte, 1866

Oedemeridae
Oxacis laevicollis (Horn, 1896)

Scarabaeidae
Anomala delicata Casey, 1915
Canthon indigaceus Matthews, 1962
Chrysina gloriosa (Fall, 1905)
Copris lecontei Gory & Percheron. 1883
Cotinis impia Deloya & Ibanez-Bernal & Nogueira, 2000
Cotinis mutabilis (Fabricius, 1787)
Cotinis sinitoc Deloya, Ibanez-Bernal & Nogueira, 2000
Digitonthophagus gazella Casey, 1890
Oxygrylius ruginasus LeConte, 1851

Tenebrionidae
Argoporis alutacea Blaisell, 1909
Argoporis costipennis Solier, 1848
Eleodes anthracinus Blaisdell, 1909
Eleodes eschscholtzi (Say, 1824)
Eupsophulus castaneus (Horn, 1870)
Eusattus reticulatus LeConte, 1851
Stenomorpha marginata (Fabricius, 1775)
Stenomorpha obovata (LeConte, 1851)

Trogossitidae
Temnoscheila virescens Fabricus, 1875

DIPTERA

Asilidae
Archilestris magnificus (Walker, 1854)

Bombyliidae
Hemipenthes jaennickeana (Osten Sacken, 1896)

HEMIPTERA

Belostomatidae
Abedus herberti Hidalgo, 1935

Cicadidae
Cacama sp.
Cornuplura curvispinosa (Davis, 1936)
Diceroprocta swalei (Distant, 1904)

Coreidae
Acanthocephala thomasi (Uhler, 1872)

Largidae
Largus californicus (Van Duzee, 1923)

Lygaeidae
Melacoryphus lateralis Dallas, 1852
Melanopleurus belfragei (Stål, 1874)

Nepidae
Ranatra quadridentata Stål, 1862

Pyrrhocoridae
Dysdercus bimaculatus (Stål, 1854)

Reduviidae
Apiomerus flaviventris Herrich-Schaeffer, 1846
Pselliopus zebra (Stål, 1862)
Rasahus biguttatus (Say, 1832)
Triatoma recurva (Stål, 1868)
Triatoma rubida (Uhler, 1894)

Scutelleridae
Pachycoris klugii (Burmeister, 1835)

HYMENOPTERA

Apidae
Xylocopa varipuncta Patton, 1879

Formicidae
Atta mexicana (Smith, 1858)
Camponotus cf. *festinatus* (Buckley, 1866)
Camponotus fragilis (Pergande, 1893)
Crematogaster dentinodis Forel, 1901
Forelius pruinosus (Roger, 1863)
Novomessor albisetosus (Mayr, 1886)
Pheidole obtusospinosa Pergrande, 1896
Pheidole rhea Wheeler, 1908
Pheidole tepicana Pergande, 1896

Pogonomyrmex barbatus (Smith, 1858)

Mutillidae
Dasymutilla asteria Mickel, 1936
Dasymutilla cf. *digitopulchra* (Smith 1855)
Dasymutilla nogalensis Mickel, 1928
Dasymutilla vestita (Lepeletier, 1845)

Sphecidae
Sphex lucae de Saussure, 1867 \
Polistes comanchus de Saussure, 1857

LEPIDOPTERA (Heterocera)
Apatelodidae
Apatelodes pudefacta Dyar, 1904
Olceclostera seraphica (Dyar, 1906)

Cossidae
Morpheis clenchi Donahue, 1980

Crambidae
Achyra occidentalis Packard, 1873
Epipagis disparilis Dyar, 1910
Frechinia helianthiales (Murt., 1897)
Jativa castanealis (Hulst, 1886)
Lamprosema canacealis Walker, 1859
Loxostege albiceralis Grote, 1878
Mimoschinia rufofascialis (Stephens, 1834)
Palpita quadristigmalis Guenée, 1854
Petrophila jaliscalis Schaus, 1906
Psara obscuralis (Lederer, 1863)
Pyrausta augustalis (Felder & Rogenhofer, 1875)
Pyrausta aurea Butler, 1875
Terastia meticulosalis Guenée, 1854
Urola nivalis (Drury, 1773)

Erebidae
Apantesis incorrupta (Edwards, 1881)
Ascalapha odorata (Linnaeus, 1758)
Bruceia pulverina Neumoegen, 1893
Bulia deducta Morrison, 1874
Caenurgina erechtea Cramer, 1782
Callistege diagonalis Dyar, 1898
Celiptera valina Schaus, 1901
Cisthene tenuifascia Harvey, 1875
Crambidia cephalica Grote & Robinson, 1870
Ctenucha venosa Walker, 1884
Estigmene albida Stretch, 1874
Euchaetes antica Walker, 1856
uchaetes fusca Rothschild, 1910
Euchaetes zella Dyar, 1902
Focillidia texana Hampson 1913
Hemeroplanis historialis (Grote, 1882)
Heteranassa mima (Harvey 1876)
Hypercompe suffusa Schaus, 1889
Lesmone detrahens (Walker 1858)
Matigramma inopinata Franclemont, 1986
Melipotis indomita Walker 1857
Melipotis jucunda Hübner, 1818
Melipotis novanda Guenée, 1852
Melipotis perpendicularis Guenée, 1852
Obrima rinconada Scaus, 1894
Pseudohemihyalea edwardsi Packard, 1864
Pseudorgyria versuta Harvey, 1875
Ptichodis ovalis Grote, 1883
Pygarctia roseicapitis Neumoegen & Dyar, 1893
Toxonprucha excavata Walker, 1865
Zale lunata Drury, 1770

Geometridae
Anacamptodes obliquaria Grote, 1883
Antepione imitata Edwards, 1884
Arcobara multilineata Hulst 1887
Chloraspilates bicoloraria arizonaria Grote, 1882
Chlorochlamys appellaria Pearsall, 1911
Cyclophora nanaria Walker, 1861
Dichordophora phoenix Prout, 1912
Eubarnesia ritaria Grossbeck, 1910
Eucaterva variaria Grote, 1882
Frederickia cyda (Druce, 1893)
Frederickia hypaethrata (Grote, 1881)
Frederickia s-signata (Packard, 1873)
Glaucina eupetheciaria Grote, 1883
Hydriomena chiricahuata Swett, 1909
Nemoria zelotes Ferguson, 1969
Pero flavisaria Grossbeck, 1906
Pero meskaria (Packard, 1876)
Pero radiosaria Hulst, 1886
Phaeoura cristifera Hulst, 1896
Philtraea elegantaria (Edwards, 1881)
Pigia multilineata Hulst, 1887
Pioneta ochreata Ferris, 2010
Psamatodes abydata (Guenée, [1858])
Synchlora frondaria Guenée, 1857
Taeniogramma octolineata (Hulst, 1887)
Tornos erectarius Grossbeck, 1909

Lasiocampidae
Apotolype brevicrista Dyar, 1895
Malacosoma incurva Edwards, 1882

Limacodidae
Cryptophobetron oropeso Barnes, 1905

Megalopygidae
Norape sorpresa Wagner & Matson, 2022
Norape tenera (Druce, 1897)

Noctuidae
Acontia areli Strecker, 1898
Acontia quadriplaga Smith
Aleptina inca Dyar, 1902

Alypiodes bimaculata Herrich-Schäffer, 1853
Amyna stricta Walker, 1858
Anicla biformata Lafontaine 2004
Bagisara buxea Grote, 1881
Bagisara laverna Druce 1889
Bryolymnia mixta Lafontaine & Walsh, 2010
Cobubatha lixiva (Grote, 1882)
Emarginea percara (Morrison, 1875)
Euscirrhopterus gloveri Grote & Robinson, 1868
Euxoa auxiliaris (Grote, 1873)
Feltia subterranea (Fabricius, 1794)
Grotella tricolor Bernard, 1904
Helicoverpa zea (Boddie, 1850)
Hemibryomima chryselectra Grote, 1880
Hemieuxoa rudens Harvey, 1874
Hexorthodes accurata Edwards, 1882
Lacinipolia rodora Dyar, 1911
Lacinipolia strigicollis Wallengren, 1860
Lacinipolia triplehorni Selman & Leuschner, 2001
Leucania oaxacana Schaus, 1898
Magusa divaricata Grote, 1874
Metaponpneumata rogenhoferi Möschler, 1890
Micrathetis triplex Walker, 1857
Neumoegenia poetica Grote, 1882
Ogdoconta moreno Barnes 1907
Oruza albocostaliata Packard, 1876
Oxycnemis advena Grote, 1882
Peridroma saucia (Hubner, 1808)
Ponometia acutus Smith, 1905
Ponometia candefacta (Hübner, 1831)
Ponometia clausula Grote, 1883
Ponometia phecolisca (Druce 1889)
Ponometia semiflava Guenee 1852
Ponometia septuosa Blanchard & Knudson 1986
Ponometia tripartita Smith, 1903
Ponometia venustula Walker, 1865
Properigea continens (Edwards, 1885)
Prothrinax luteomedia (Smith, 1907)
Spragueia dama Guenée, 1952
Spragueia funeralis Grote, 1881
Spragueia jaguaralis Hampson, 1910
Spragueia obatra (Morrison)
Tarache expolita (Grote, 1882)
Tarache geminocula Ferris & Lafontaine 2009
Tarache idella Barnes, 1905
Tarache lanceolata Grote, 1879
Tarache lucasi Smith, 1900
Tarache quadriplaga Smith 1900
Tripudia limbatus Edwards, 1881
Tripudia luxuriosa Smith, 1900

Notodontidae
Dasylopha seriata Druce, 1887
Datana perfusa Dyar, 1923
Heterocampa averna Barnes & McDunnough, 1910
Litodonta wymola (Barnes, 1905)
Notela jaliscana Schaus, 1901
Schizura biedermani Barnes & McDunnough, 1911

Psychidae
Oiketicus townsendi Townsend, 1894

Saturniidae
Agapema anona Ottolengui, 1903
Agapema galbina Clemens, 1860
Anisota oslari Rothschild, 1907
Citheronia splendens Druce, 1886
Hemileuca juno Packard, 1872
Hemileuca tricolor Packard, 1872
Rothschildia cincta Tepper, 1882
Syssphinx hubbardi (Dyar, 1902)

Sphingidae
Agrius cingulata Fabricius, 1775
Erinnyis obscura (Fabricius, 1775)
Hyles lineata (Fabricus, 1775)
Manduca quinquemaculata (Haworth)
Manduca rustica (Fabricius, 1775)
Manduca sexta (Linnaeus, 1763)
Proserpinus terlooii Edwards, 1875

LEPIDOPTERA (Rhopalocera)
Hesperiidae
Atrytonopsis edwardsi Barnes & McDunnough, 1916
Burnsius albescens Plötz, 1884
Burnsius philetas (Edwards, 1881)
Cecropterus casica (Herrich-Schäffer, 1869)
Cecropterus dorantes (Stoll, 1790)
Celotes nessus (Edwards, 1877)
Cogia hippalus (Edwards, 1882)
Erynnis funeralis (Scudder & Burgess, 1870)
Lerodea eufala (Edwards, 1869)
Oarisma aurantiaca (Hewitson, 1868)
Oarisma minima (Edwards, 1870)
Pholisora catullus (Fabricius, 1793)
Staphylus ceos (Edwards, 1870)
Systasea zampa (Edwards, 1876)

Lycaenidae
Brephidium exile (Boisduval 1852)
Callophrys gryneus siva (Edwards, 1874)
Echinargus isola (Reakirt, 1867)
Hemiargus ceraunus (Fabricius, 1793)
Leptotes marina (Reakirt, 1868)
Ministrymon leda (Edwards, 1882)
Strymon istapa (Reakirt, 1867)
Strymon melinus Hübner, 1818

Nymphalidae
Anthanassa texana (Edwards, 1863)
Asterocampa leilia (Edwards, 1874)
Chlosyne lacinia (Geyer, 1837)

Danaus gilippus (Cramer, 1775)
Dione vanillae (Linnaeus, 1758)
Dymasia dymas (Edwards, 1877)
Junonia evarete (Cramer, 1779)
Danaus gilippus (Cramer, 1775)
Dione vanillae (Linnaeus, 1758)
Dymasia dymas (Edwards, 1877)
Junonia evarete (Cramer, 1779)
Libytheana carinenta (Cramer, 1777)
Microtia elva H. Bates, 1864
Vanessa cardui (Linnaeus, 1758)

Papilionidae
Battus philenor (Linnaeus, 1771)
Heraclides rumiko Shiraiwa & Grishin, 2014
Papilio multicaudata W.F. Kirby, 1884

Pieridae
Abaeis mexicana (Boisduval, 1836)
Nathalis iole Boisduval, 1836
Phoebis agarithe (Boisduval, 1836)
Phoebis sennae (Linnaeus, 1758)
Pontia protodice (Boisduval & LeConte, 1830)
Pyrisitia proterpia (Fabricius, 1775)
Zerene cesonia (Stoll, 1790)

Riodinidae
Apodemia hepburni Godman & Salvin, 1886
Apodemia mejicanus (Behr, 1865)
Apodemia palmerii (Edwards, 1870)
Calephelis nemesis (Edwards, 1871)

MANTODEA
Mantidae
Pseudovates arizonae Hebard, 1935
Stagmomantis californica Rehn & Hebard, 1909
Stagmomantis limbata (Hahn, 1835)
Asterocampa leilia (Edwards, 1874)
Chlosyne lacinia (Geyer, 1837)

MEGALOPTERA
Corydalidae
Corydalus texanus Banks, 1903

NEUROPTERA
Ascalaphidae
Ululodes mexicanus (McLachlan, 1871)
Mermeontidae
Vella fallax (Rambur, 1842)

ODONATA
Aeshnidae
Anax junius (Drury, 1773)
Coenagrionidae
Apanisagrion lais (Selys, 1876)
Argia anceps Garrison, 1996
Argia extranea (Hagen, 1861)
Argia hinei Kennedy, 1918
Argia nahuana Calvert, 1902
Argia pallens Calvert, 1902
Argia plana Calvert, 1902
Enallagma civile (Hagen, 1861)
Enallagma praevarum (Hagen, 1861)
Hesperagrion heterodoxum (Selys, 1868)
Telebasis salva (Hagen, 1861)
Lestidae
Archilestes grandis (Rambur, 1842)
Libellulidae
Dythemis maya Calvert, 1906
Erythrodiplax basifusca (Calvert, 1895)
Libellula saturata Uhler, 1857
Orthemis ferruginea (Fabricius, 1775)
Perithemis intensa Kirby, 1889
Pseudoleon superbus (Hagen, 1861)
Sympetrum corruptum (Hagen, 1861)

ORTHOPTERA
Acrididae
Acantherus piperatus Scudder & Cockerell, 1902
Arphia pseudonietana (Thomas, 1870)
Aztecacris gloriosa (Hebard, 1935)
Barytettix humphreysii (Thomas, 1875)
Conozoa carinata Rehn, 1907
Dactylotum bicolor Charpentier, 1843
Heliastus benjamini Caudell, 1905
Hippopedon gracilipes (Caudell, 1905)
Lactista azteca (Saussure, 1861)
Leprus wheeleri Saussure, 1888
Melanoplus differentialis (Thomas, 1865)
Melanoplus lakinus (Scudder, 1878)
Schistocerca albolineata (Thomas, 1875)
Schistocerca nitens (Thunberg, 1815)
Syrbula montezuma (Saussure, 1861)
Trimerotropis pallidipennis (Burmeister, 1838)
Gryllidae
Oecanthus cf. *rileyi* Baker, 1905
Myrcecophilidae
Myrmecophilus manni Schimmer, 1911
Romaleidae
Brachystola magna (Girard, 1853)
Phrynotettix tshivavensis (Haldeman, 1852)
Taeniopoda eques (Burmeister, 1838)
Tettigoniidae
Insara elegans (Scudder, 1901)

PHASMATODEA
Diapheromeridae
Diapheromera arizonensis Caudell, 1903

Fig. 1. Cerro Picacho de Bacoachi towers over Rancho Las Playitas. Photo by Ana L. Reina-Guerrero.

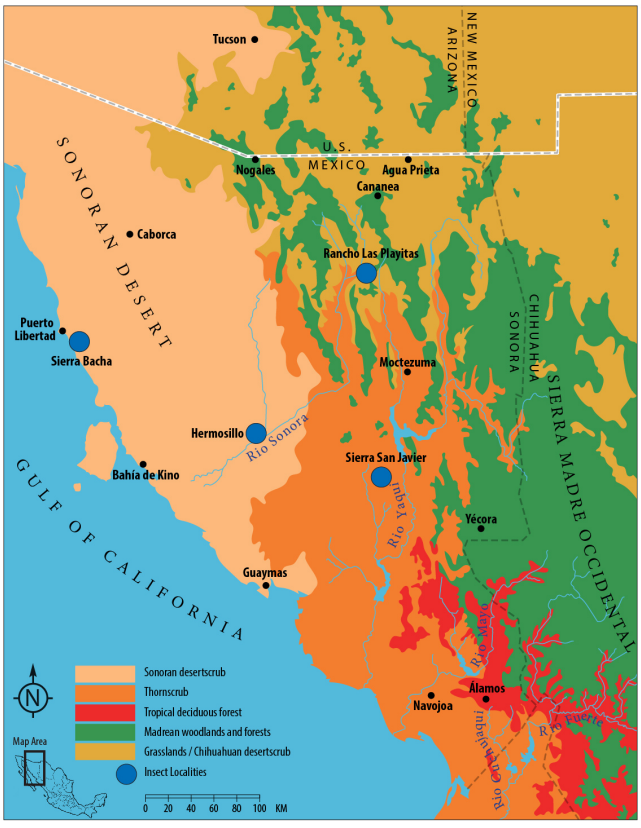


Fig. 2. Map of the Rancho Las Playitas and other insect faunas mentioned in the text. Based on Brown and Lowe (1978).

© 2024 Universidad de Guadalajara, *Dugesiana* 31(1): 75-92

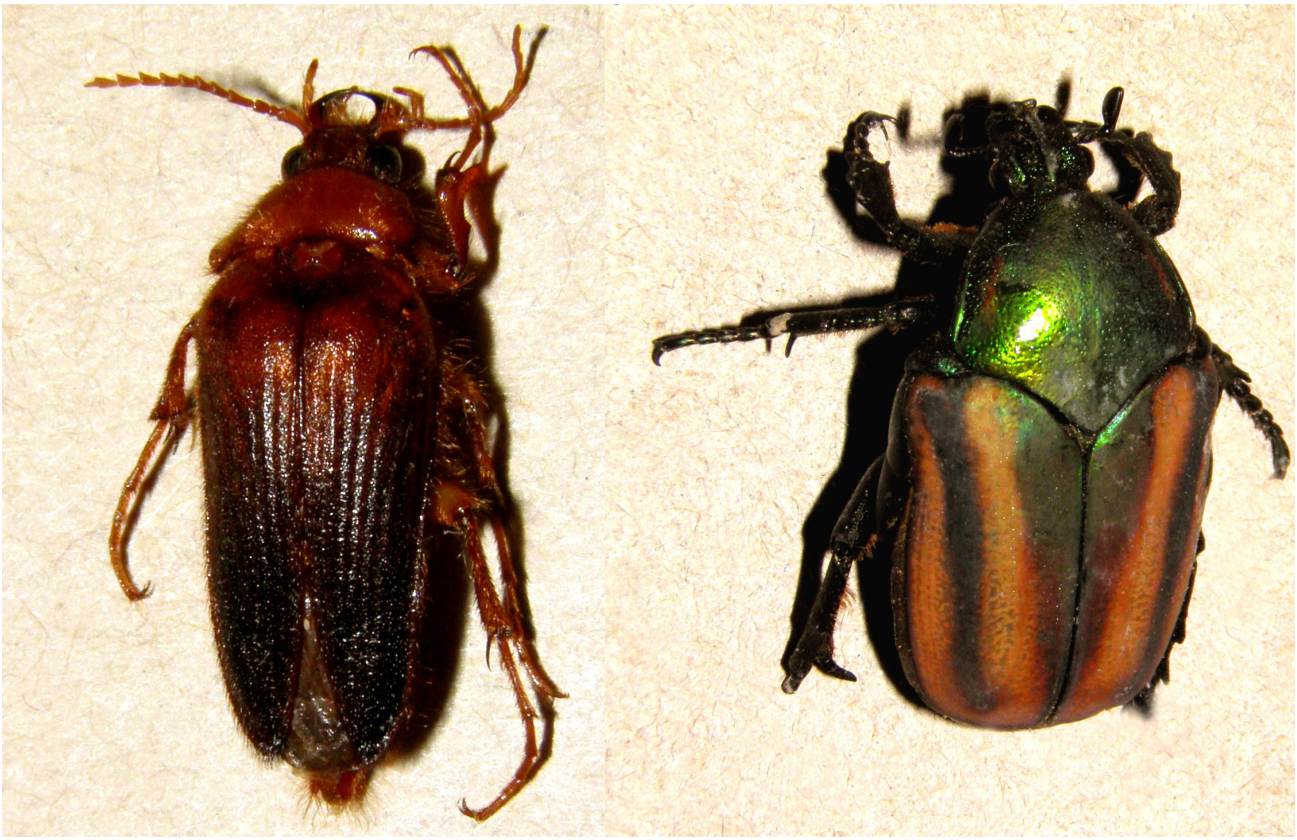


Fig. 3. Coleoptera. **A.** *Scaptolenus paltingi* (Elateridae). Rancho Las Playitas. **B.** *Cotinis sinitoc* (Scarabaeidae). Arroyo Las Padercitas. Photos by T. R. Van Devender.

Fig. 4. Hemiptera. **A.** *Apiomerus flaviventris* (Reduviidae). Arroyo Las Padercitas. Photo by Gertrudis Yanes-Arvayo. **B.** *Pachycoris klugii* (Scutelleridae). Rancho Las Playitas. Photo by Susan D. Carnahan.

Fig. 5. Lepidoptera (moths): **A.** *Morpheis clenchi* (Cossidae). Rancho Las Playitas. Photo by Susan D. Carnahan. **B.** *Philtraea elegantaria* (Geometridae). Arroyo Las Padercitas Photo by R. Wayne Van Devender.

Fig. 6. Lepidoptera (butterflies). **A**. *Asterocampa leilia* (Nymphalidae). **B.** *Oarisma aurantiaca* (Hesperiidae). Barranco Basaitequi. Photos by Guillermo Molina-Padilla.

Fig. 7. Mantodea (Mantidae). **A.** *Pseudovates arizonae*. **B.** *Stagmomantis californica*. Barranco Basaitequi. Photos by J. Gerardo Martínez-Valenzuela. and Guillermo Molina-Padilla.

Fig. 8. **A.** *Corydalus texanus* (Megaloptera: Corydalidae). Aguaje el Palmillalito. **B.** *Ululodes mexicanus* (Neuroptera: Ascalaphidae). Barranco Basaitequi. Photos by Guillermo Molina-Padilla.

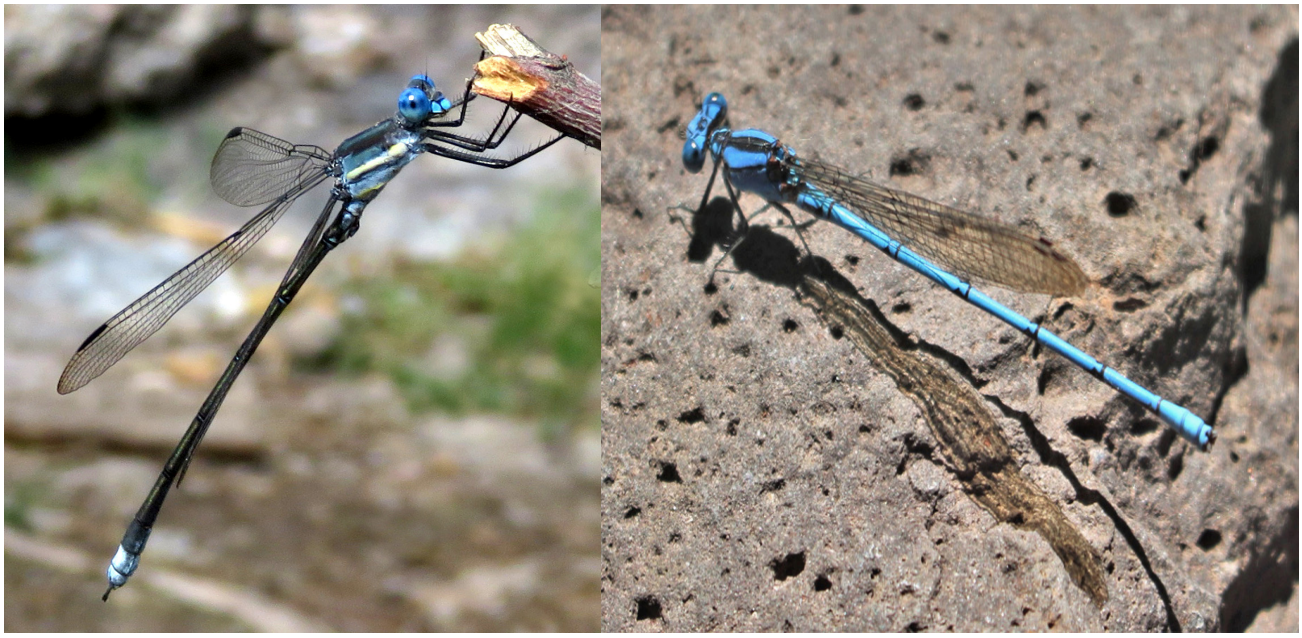


Fig. 9. Odonata. **A.** *Archilestes grandis* (Lestidae). Aguaje el Palmillalito. Photo by Guillermo Molina-Padilla. **B.** *Argia anceps* (Coenagrionidae). Arroyo Cajón del Agua, Sierra Cucurpe. Photo by Doug Danforth.

Fig. 10. Orthoptera. **A**. *Aztecacris gloriosus* (Acrididae). Rancho Las Playitas. Photo by José Abel Salazar-Martínez. **B.** *Heliastus benjamini* (Acrididae). Barranco Basaitequi. Photo by Guillermo Molina-Padilla. **C.** *Oecanthus* cf. *rileyi* (Gryllidae). Rancho La Gotera. Photo by Hugo Silva-Kurumiya. **D.** *Phrynotettix tschivavensis.* (Romaleidae). Rancho Las Playitas. Photo by Susan D. Carnahan.

Los manuscritos recibidos para su evaluación y posible publicación en Dugesiana son evaluados al menos por dos árbitros anónimos especialistas en la temática del artículo, generalmente ajenos al comité editorial. Es indispensable que el autor envíe el nombre de tres especialistas, con sus respectivos correos electrónicos para ser considerados en el proceso de evaluación. La sugerencia debe venir en un archivo independiente.

Todos los mansucritos serán evaluados en el sistema Turnitin para verificar la originalidad del mismo.

Para someter a revisión un trabajo que desee ser publicado en Dugesiana, el manuscrito se debe ajustar a las siguientes normas editoriales:

- El manuscrito debe estar escrito en Word, a doble espacio, márgenes de 2.5 cm y sangría de 0.5 cm.
- Sin formato especial: elimine el espaciado automático entre párrafos, no dar espacios con la barra o tecla espaciadora; nunca utilizar los encabezados del sistema de word.
- Escrito con letra (fuente) Times New Roman a 12 puntos.
- Numerar las páginas consecutivamente, colocar el número en la parte inferior central.
- Se aceptan manuscritos en español, inglés y portugués.

El texto deberá incluir las siguientes secciones: Título en el idioma original, Título en español, Resumen, Palabras claves, Abstract (inglés), Key words, Introducción, Material y métodos, Resultados, Discusión, Agradecimientos y Literatura citada. Los encabezados deben escribirse con mayúsculas, negritas y estar centrados en el texto. Si el manuscrito está en español o portugués, se debe incluir un título en inglés. Si el manuscrito está en inglés se debe incluir un título en español.

- Utilizar un título corto como cabecera, máximo 16 palabras. En caso de utilizar nombres científicos, colocar el apellido del descriptor y el año de descripción separados por una coma. Es importante adicionar entre paréntesis el nombre del orden y familia. Todos los trabajos deben llevar el título en dos idiomas, dando preferencia al inglés y español.
- Nombre completo de autores con mayúsculas y minúsculas, seguidos por las direcciones postales adecuadamente relacionadas con números en superíndice y el autor de correspondencia con asterisco.
- Las direcciones o afiliaciones de los autores deberán estar señaladas inicialmente con el número en superíndice que le corresponde. Mencionar las dependencias en orden jerárquico de menor a mayor grado. Ejemplo: Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México. No abreviar los nombres de las instituciones. Además de señalar la ciudad, estado y país (en este orden).
- Incorporar el número ORCID para cada autor.
- Resumen: párrafo que no debe exceder de 300 palabras, ni incluir referencias.
- Palabras clave: hasta ocho palabras, distintas de las que se incluyen en el título del manuscrito.
- Abstract: versión en inglés del resumen (debe ser una traducción, nunca algo diferente al resumen). No debe exceder las 300 palabras.
- Key words: hasta ocho y ser equivalentes a las palabras clave.
- Los encabezados para subtítulos en las secciones Introducción, Material y métodos, Resultados, se escribirán con mayúscula inicial y en negritas.
- Los nombres científicos siempre deberán escribirse en cursivas o itálicas; nunca subrayados. La primera vez que se mencionen deben ir seguidos por el autor (es) que describió (eron) la especie y el año de descripción, separados por una coma; por ejemplo: *Oxyporus lawrencei* Campbell, 1974. Este formato debe incluirse también en el Resumen y Abstract. En caso de citar nombres regulados por un código de nomenclatura diferente al de Zoología, deberá colocarse entre paréntesis al menos el nombre de la familia a la que pertenece el taxón. El apellido del descriptor debe estar escrito completo.
- Al final del artículo y en página aparte, se incluirá la sección para los pies de figura y los cuadros, con sus respectivos encabezados. Para facilitar la edición de los mismos, nunca utilice imágenes de los cuadros, siempre elaborarlos con texto con las herramientas del procesador Word.
- Las figuras, mapas o fotografías serán presentadas por separado del texto, en formato TIFF con una resolución de 300 dpi o mayor. Todas deben numerarse de manera continua como figuras, de acuerdo con su señalamiento en el cuerpo del manuscrito. En caso de existir varias, es indispensable organizarlas en láminas. Se pueden enviar imágenes a color, siempre y cuando sean de alta resolución (600 dpi), con muy buena definición y que su publicación a color se considere indispensable. Las imágenes que no reúnan estos requisitos no se publicarán a color. Todas deben incorporarse a la plataforma de la revista. Para su evaluación, es necesario enviar un archivo pdf con todas las imágenes.
- En las imágenes y cuadros, en caso de haber sido tomados o modificados de otra fuente, mencionar el autor de los mismos o aclarar que son de autoría propia cuando fueron realizados por el o los autores.

- Agradecimientos: Además de los nombres de personas e instituciones que apoyaron aspectos del trabajo, pueden incluirse créditos a proyectos, programas, becas u otros datos pertinentes al trabajo o al (los) autor (es). Para ello, mencione el nombre de la institución u organización que dio el apoyo, agregue nombre y/o número del proyecto o contrato.
- Literatura citada: la cita en texto se incluye sin comas entre autor y año ejemplo: (López 1980), (López y Hernández 1980). Es oportuno recordar que de esta forma, se diferenciará entre las citas bibliográficas y la referencia al descriptor y año de descripción de un taxón. No utilizar el operador "&" (ampersand); no incluir sangrías, justificación o numeración. En la lista, todas las referencias se deben organizar en orden alfabético. Cuando se mencionen varios artículos del mismo autor, éstos se presentarán en orden alfabético, cronológico y por número de autores. Si hay dos artículos con el (los) mismo (s) autor (es) y año, deberán diferenciarse por las letras 'a', 'b', … En cursivas deberán escribirse los títulos de libro, nombre de revista y título de tesis (en lo posible evitar citas de tesis y resúmenes de eventos académicos); no se permiten citas de páginas de internet, pero pueden incluirse referencias a publicaciones electrónicas o digitales, bases de datos o software. Las conjunciones de los autores deben escribirse en el idioma original de la obra citada. Ejemplo: y, and, et, und.

Ejemplos:

Libros [sin páginas totales]:

Morón, M.A., B.C. Rattclife y C. Deloya (Eds). 1997. *Atlas de escarabajos de México: Coleoptera: Lamellicornia, Vol. I Familia Melolonthidae*. CONABIO-SME, México, D.F.

Coloque la ciudad correspondiente en función de la fecha de la obra. Algunas ciudades de edición pueden cambiar con el tiempo. Es el caso de la Ciudad de México.

Capítulos de libro [los nombres de los editores ordenados de manera similar que los nombres de los autores del capítulo]:

Edmunds, G.F. and D. Waltz. 1995. Ephemeroptera. (pp. 126-163). In: Merritt, R.W. and K.W. Cummins (Eds.). *An Introduction to the Aquatic Insects of North America*. Kendall-Hunt, Dubuque.

Artículos [El nombre de la revista debe escribirse completo. Es indispensable incluir el número de la revista cuando éste existe. Para el caso particular de Folia Entomológica Mexicana, Acta Zoológica Mexicana, Zootaxa y, en general, para aquellas publicaciones que durante un tiempo utilizaron o siguen utilizando sólo el número (excluyendo el volumen), coloque el número de la revista entre paréntesis]:

Fitzgerald, T.D., A. Pescador-Rubio, M.T. Turna and J.T. Costa. 2004. Trail marking and processionary behavior of the larvae of the weevil Phelypera distigma (Coleoptera: Curculionidae). *Journal of Insect Behavior*, 17(5): 627-646.

Huerta, C. y G. Halffter. 2000. Factores involucrados en el comportamiento subsocial de Copris (Coleoptera: Scarabaeidae: Scarabaeinae). *Folia Entomológica Mexicana*, (108): 95-120.

Kohlmann, B. and A. Solís. 2006. New species of dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) from Mexico and Costa Rica. *Zootaxa*, (1302): 61-68.

Tesis [Evitar en lo posible este tipo de referencias]:

Contreras-Ramos, A. 1990. *The inmature stages of* Platyneuromus *(Corydalidae) with a key to the genera of larval Megaloptera of Mexico.* M. Sc. Thesis, University of Alabama, Tuscaloosa.

Memorias de congresos, simposios y otras reuniones [Evitar en lo posible este tipo de referencias. En caso de ser necesario contactar al editor].

Publicaciones y sitios web, bases de datos y Software (debe incluirse la dirección electrónica y la fecha de consulta):

Oksanen, J., F. Guillaume Blanchet, R. Kindt, P. Legendre, R. B. O'Hara, G. L. Simpson, P. Solymos, M. H. H. Stevens and H. Wagner 2011. vegan: Community Ecology Package. R package version 1.17-8. http://www.rproject.org/. Fecha de consulta: 12 de diciembre de 2016.

Linbos. 2014. Los insectos del bosque seco. http://1.linbos.net/. Fecha de consulta: 12 de diciembre de 2016.

Sistema Meteorológico Nacional. 2016. Información climatológica. http://smn.cna.gob. mx/es/climatologia/informacion-climatologica. Fecha de consulta: 12 de diciembre de 2016.

Steinkraus, D. 2004. Strange facts about soldier beetles infected with the poorly known fungal pathogen, Erynopsis lampyridarum. Papers of the 2004 Entomological Society of America Annual Meeting and Exhibition. Disponible en: https://esa. confex.com/esa/2004/techprogram/paper_17245. htm. Fecha de consulta: 12 de diciembre de 2016.

No existen sobretiros impresos, solo digitales, los cuales pueden descargarse desde la página de la revista: http://148.202.248.171/dugesiana/index.php/DUG/issue/archive.

Descripción de taxones

Se debe adaptar a las características de un artículo. La descripción del taxón debe contener los siguientes elementos: nombre, diagnosis, descripción, material tipo, etimología, biología, distribución y comentarios taxonómicos. Para los trabajos de Taxonomía deben tomarse en cuenta las consideraciones del Código Internacional de Nomenclatura Zoológica cuarta edición (1999).

Taxonomía y técnicas de estudio

Los encabezados del manuscrito deberán incluir: Resumen, Abstract (inglés), Introducción, Tratamiento taxonómico, Discusión, Agradecimientos y Literatura citada. En caso de considerar necesaria la inclusión de otras secciones, éstas se pueden incluir respetando: encabezados escribir con mayúsculas y centrados en el texto; subtítulos con mayúsculas y minúsculas y con sangría. Este tipo de contribuciones debe ser un aporte detallado al estudio de un taxón particular.. Los encabezados quedan a juicio del autor (es), pero es recomendable que estén acompañadas de ilustraciones. En estas secciones se incluyen aquellos trabajos de tipo catálogo, inventarios, descripción o redescripción de especies, claves, etc. Los manuscritos sobre grupos particulares (ejemplo: Odonata, Coleoptera, entre otros) deben mencionar aspectos sobre la biología del grupo, técnicas de estudio (en campo y gabinete), así como claves dicotómicas, mínimo para nivel de familia. Se recomienda la inclusión de figuras en las claves las cuales deben organizarse en láminas. Los trabajos deben ser originales y enfocarse principalmente a México o la región Neotropical.

Ensayo

Los encabezados del texto de un ensayo deberán incluir: Resumen, Abstract (inglés), Introducción, Discusión, Conclusiones y/o sugerencias, Agradecimientos y Literatura citada. En caso de considerar necesaria la inclusión de otras secciones, éstas se pueden incluir respetando: encabezados escribir con mayúsculas y centrados en el texto; subtítulos con mayúsculas y minúsculas y con sangría. Los ensayos deben ser trabajos analíticos y con propuestas o posiciones claras de parte del autor (es).

Nota Científica

No se aceptan notas científicas.

Reseña bibliográfica

No se aceptan reseñas bibliográficas.

Para mayores detalles, contactar a:

Editor

Dr. José Luis Navarrete-Heredia, Centro de Estudios en Zoología, CUCBA, Universidad de Guadalajara, Apdo. Postal 134, 45100, Zapopan, Jalisco, México,

glenusmx@gmail.com

o

Asistente editorial

M. en C. Ana Laura González-Hernández, Centro de Estudios en Zoología, CUCBA, Universidad de Guadalajara, Apdo. Postal 134, 45100, Zapopan, Jalisco, México, alaura.gonzalez@academicos.udg.mx

The received manuscripts for their assessment and possible publishing in Dugesiana are revised at least by two anonymous specialists who are familiar with the area of study and usually not part of the editorial committee. It is essential that the reference of three specialists is sent by the author as well as their e-mail addresses since they are considered when assessing. Add a file with the list of the names.

All manuscripts will be evaluated in the Turnitin System to verify their originality.

In order to have reviewed the work to be published in Dugesiana, the manuscript has to follow the next publishing rules:

- The manuscript is to be written in Word, double space, with a margin of 2.5 cm and indentation of 0.5 cm.
- No special format: delete automatic spacing between paragraphs, no spacing out with spacing key and no using Microsoft Word headlines.
- Written with Times New Roman format, size 12.
- Numbered pages. Add page number below and centered.
- Manuscripts in Spanish, English and Portuguese are accepted.

Text should contain the following aspects: original language title, title in Spanish, abstract, key words, abstract in English, introduction, material, as well as methods. Results, a discussion, acknowledgments and references to quoted literature (as literature cited). Headline should be written in capitals, bold and centered. Manuscripts in Spanish, English and Portuguese are preferred. Should the manuscript be in Spanish or Portuguese, then it should contain a title in English.

- Short title as headline, no more than 16 words. Regarding scientific names, last name and year of description should be separated by a comma. It is important to add name of order and family in parenthesis. Every title should be written in two languages, where mainly English and Spanish will be used.
- Complete name of authors in capital and small letters, followed by the corresponding addresses related with superscript numbers as well as the corresponding author marked with an asterisk.
- Addresses or affiliations of authors should be indicated initially with the superscript number that corresponds to them. Mention the dependencies in hierarchical order from lower to higher degree. For example: Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México. Do not abbreviate the names of institu- tions, and add the city, state and country (in this order).
- Add ORCID number for each author.
- Abstract: paragraph that should not exceed 300 words, not include references.
- Keywords: up to eight words, many of which are included in the title of the paper.
- Resumen: Spanish version of abstract (must be a translation, never something different). Not exceed 300 words.
- Palabras clave: Spanish version of keywords, with the same indications.
- Subtitle headings in “Introduction, Material and Methods, Results, Discussion and Acknowledgments” sections will be written in initial capital letters and bold.
- Scientific names should be always be written in italics, but never underlined. The first time mentioned, they should be followed by the author/ authors who described the specie and year of description, separated by a comma. e.g. “Oxyporus lawrencei Campbell, 1974.” This format should also be included in the abstract. In case of quoting names regulated by a nomenclature code being different to the one used in zoology, the family name belonging to taxon should be written in pa- rentthesis. The descriptor full name should be writ- ten as well.
- At the end of the article and in a separated page, the footnotes and tables, with their respective headings, will be included. For editing purposes, the tables should never be drawn as images, do it using the Word tools.
- Figures, maps, or photographs will be presented separately from the text in TIFF format with a resolution of 300 ppp or larger. All of them should be numbered continuously as figures, according to the manuscript body. In case of having sever- al, it is essential to have them organized as plates. Colored pictures are accepted, provided that their resolution is high (600 ppp), as well as their defi- nition; as long as their colored publishing is re- ally essential. Pictures not accomplishing these requirements will not be published in color. All of them should be uploaded in the platform of the magazine. As for their assessment, it is necessary to send a pdf file including all the pictures.
- Regarding pictures and charts taken from another source, either the author should be mentioned or their authorship should be mentioned.

- Acknowledgments: besides the names of people and institutions that supported the work, credit can be given to projects, programs, scholarships as well as other data concerning the work as well as authors. In that case, you should include not only the name of the institution, that is, organiza- tion, but also the name and/or number of project, that is, contract.
- Literature cited: literature is to be written without commas between the author and year, e.g.: (López 1980), (López y Hernández 1980). It is worth remembering that in this way, quote and reference to the descriptor as well as a taxon's description can be differentiated. Do not use the operator "&" (ampersand); as well as indentation, justification or numeration. All references should be organized alphabetically. If several articles from the same author are to be mentioned; these will be present- ed in alphabetical, chronological order as well as by number of authors. In case there are two arti- cles with the same author and year, they are to be differentiated by using the letters 'a', 'b'… Titles of book, magazine as well as the title of a thesis should be written in italics (quotes from thesis and congress or symposium reports should be avoided as much as possible). Website references are not allowed; nevertheless, references from electronic publishing, data base as well as software may be included. Conjunctions from the authors should be written in the original language, e.g.: y, and, et, und.

Examples:

Books [no total page number]:

Morón, M.A., B.C. Rattclife y C. Deloya (Eds). 1997. *Atlas de escarabajos de México: Coleoptera: Lamellicornia, Vol. I Familia Melolonthidae*. CONABIO-SME, México, D.F.

Write the corresponding city according to the date. Some cities might change through time, such as Mexico City.

Book chapters [the name of the editors organized in a similar way as the name of the chapter's authors]:

Edmunds, G.F. and D. Waltz. 1995. Ephemeroptera. (pp. 126-163). In: Merritt, R.W. and K.W. Cummins (Eds.). *An Introduction to the Aquatic Insects of North America*. Kendall-Hunt, Dubuque.

Articles [the journal's name should be written completely; not to forget that the number of journal should be written when it exists. As for Folia Entomologica Mexicana, Acta Zoologica Mexicana, Zootaxa as well are publishing only using the number (leaving out the volume), parenthesis should be for the number of the magazine.

Fitzgerald, T.D., A. Pescador-Rubio, M.T. Turna and J.T. Costa. 2004. Trail marking and processionary behavior of the larvae of the weevil Phelypera distigma (Coleoptera: Curculionidae). *Journal of Insect Behavior*, 17(5): 627- 646.

Huerta, C. y G. Halffter. 2000. Factores involucrados en el comportamiento subsocial de Copris (Coleoptera: Scarabaeidae: Scarabaeinae). *Folia Entomológica Mexicana*, (108): 95-120.

Kohlmann, B. and A. Solís. 2006. New species of dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) from Mexico and Costa Rica. Zootaxa, (1302): 61-68.

Thesis [is recommended to avoid this type of references]:

Contreras-Ramos, A. 1990. *The inmature stages of* Platyneuromus *(Corydalidae) with a key to the genera of larval Megaloptera of Mexico.* M. Sc. Thesis, University of Alabama, Tuscaloosa.

Congresses, symposia and other meetings reports [Avoid in this type of references. If is necessary to include this type of references please contact the editor].

Online publications and websites, database and software (e-mail address and search date should be included)

Oksanen, J., F. Guillaume Blanchet, R. Kindt, P. Legendre, R. B. O'Hara, G. L. Simpson, P. Solymos, M. H. H. Stevens and H. Wagner 2011. vegan: Community Ecology Package. R package version 1.17-8. http://www.rproject.org/. Search date: 12 de diciembre de 2016.

Linbos. 2014. Los insectos del bosque seco. http://1.linbos.net/. Search date: December 12th, 2016.

Sistema Meteorológico Nacional. 2016. Información climatológica. http:// smn.cna.gob.mx/es/climatologia/informacion-climatologica. Search date: December 12th, 2016.

Steinkraus, D. 2004. Strange facts about soldier beetles infected with the poorly known fungal pathogen, Erynopsis lampyridarum. Papers of the 2004 Entomological Society of America Annual Meeting and Exhibition. Available on: https://esa.confex.com/ esa/2004/techprogram/paper_17245. htm. Search date: December 12th, 2016.

No reprints, only digital which can be downloaded from the magazine website: http://148.202.248.171/dugesiana/index.php/DUG/issue/archive

Taxa description

Adapted to the features of the article. It should include the following elements: name, diagnosis, description, type of material, etymology, biology, distribution, as well as taxonomic remarks. For thsese papers recommendations from "The International Code of Zoological Nomenclature", fourth edition (1999) should be kept in mind.

Taxonomy and study methodology

Headlines should include: resumen, abstract (in English), introduction, taxonomical work, discussion, thank-you note, as well as references. In case of considering other sections, those can be included provided that the headlines are written in capital letters and centered; subtitles in capital and small letters as well as an indentation. This type of contributions will be a detailed study of a particular taxon. Regarding contributions for taxonomy and study methodology areas, headlines are up to the author's criteria; however, it is highly recommended to have pictures. Catalogs, inventories, description of species, among others should be included in this section. Manuscripts about some particular groups, such as Odonata, Coleoptera, among others, should mention aspects about the taxa biology, study methodologies (in field and others), as well as dichotomous keys, at least at a family level. It is highly recommended to include figures that should be organized as prints. The work should be original and focused mainly either on Mexico or the Neotropical region.

Essay

Headings should include: Resumen, Abstract, Introduction, Discussion, Conclusions and / or suggestions, Acknowledgments and Literature quoted. In case it is considered necessary to include other sections, these can be included respecting: headings written in capital letters and centered in the text; uppercase and lowercase captions and indented. The essays must be analytical works and with clear propositions or positions on the part of the author(s).

Scientific note

Not accepted.

Book reviews

Not accepted.

It is considered that the author(s) agree with publishing the results of the research in the journal "Dugesiana" and to testify that there is no conflict of interests, as well as to claim that it is an original version and it has not been sent to another magazine to be assessed.

For any other situation not related to the ones mentioned, please get in touch with the editor.

Editor

Dr. José Luis Navarrete-Heredia, Centro de Estudios en Zoología, CUCBA, Universidad de Guadalajara, Apdo. Postal 134, 45100, Zapopan, Jalisco, México,

glenusmx@gmail.com

or

Editorial assistant

M. en C. Ana Laura González-Hernández, Centro de Estudios en Zoología, CUCBA, Universidad de Guadalajara, Apdo. Postal 134, 45100, Zapopan, Jalisco, México,

alaura.gonzalez@academicos.udg.mx